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ERRATA

VOLUME XXX

page 217 line 12 delete '[*Verticillium cinerescens*: cf. ibid., 29, p. 606]'

VOLUME XXXI

33 5 for '*P.*' read '*Puccinia*'
40 15 for 'arsenite' read 'arsenate'
77 44 for 'ibid.' read '*R.A.M.*'
85 29 for '*P.*' read '*Pleospora*'
92 39 for '*Daedalia*' read '*Daedalea*'
124 19 for '*poae-hemoralis*' read '*poae-nemoralis*'
148 21 for '*polygala*' read '*polyphaga*'
182 13 for '(F.P.)' read '(E.P.)'
207 43 for 'ibid.' read '*R.A.M.*'
208 39 for '*spiculosporum*' read '*spiculisporum*'
249 5 and 9 before 'cu. ft.' insert '100'
266 39 for 'a strain of bean mosaic virus' read 'a strain of lucerne mosaic virus'
298 33 for '*F.* [*G.*] *moniliforme*' read '*F. moniliforme* [*G. fujikuroi*]'
299 51 for 'Tainan, Formosa' read 'Taiwan (Formosa)'
331 45 for '1.025' read '1025'
355 4 for '*acacia-senegalae*' read '*acaciae-senegalae*'
458 41 for 'loc. cit.' read 'ibid., 31, p. 295'
539 27 for 'Kamal' read 'Karnal'
541 4 for '*Shizanthus*' read '*Schizanthus*'
555 43 for '*penicilloides*' read '*penicillioides*'
591 28 for 'Siefenersatzmitteln' read 'Seifenersatzmitteln'

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COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
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SARAVI CISNEROS (R.). **El marchitamiento de los Pinos provocado por 'Diplodia pinea' Kickx en la Provincia de Buenos Aires (Argentina).** [The Pine blight induced by *Diplodia pinea* Kickx in the Province of Buenos Aires (Argentina).] —*Rev. Fac. Agron. La Plata*, Ser. 3, 27, 2, pp. 163–179, 3 figs., 1950. [English summary.]

Diplodia pinea, the agent of a serious blight of pine trees [*R.A.M.*, 22, p. 123 *et passim*], has been known in Argentina since 1910, when it was recorded by Spegazzini (as *Sphaeropsis pinicola*) in his fifth list of Argentine fungi (*An. Mus. nac. B. Aires*, 20, pp. 329–467). It was also included by Carrera *et al.* in their list of plant diseases observed in Argentina from 1930 to 1941, presented at the Second Inter-American Congress of Agriculture, Mexico, D.F., 1942. The present study is concerned with the economic importance, host range, symptomatology, geographical distribution, and control of the disease, and a full account is also given of the methods and results of a series of inoculation experiments (57 in all) on wounded and unwounded seedlings of nine species of *Pinus*.

The disease is actually important as a cause of gradual decline among ornamental pines through the repeated destruction of buds and shoots, and potentially so as a threat to the plantings in course of establishment for the fixation of the dunes along the Atlantic coast. It has been reported from Santa Fé (*Tec. Publ. Inst. exp. Invest. agric.* 44, 20 pp., 1943), as well as from the city of La Plata, Miramar, and Delta of Paraná, Buenos Aires. Eight of the nine species of *Pinus* inoculated with *D. pinea* proved to be susceptible, namely, *P. radiata*, *P. halepensis*, *P. pinaster*, *P. caribaea*, *P. sylvestris*, *P. canariensis*, and *P. thunbergii*; only *P. palustris* gave negative results. It appears from these experiments that the pathogen attacks directly tender organs, such as buds, growing shoots, and leaves, while twigs and branches are invaded only through wounds.

SMITH (J. H.) & CARR (D. R.). **Principles of wood preservation. Their application under New Zealand conditions.**—*Inform. Ser. N.Z. For. Serv.* 10, 52 pp., 4 figs., 1 graph, 1 chart, 1950.

The subjects dealt with in this useful work include the deterioration of timber by wood-inhabiting fungi and its prevention in houses, the economics of preserving timber to be used outdoors and in houses, the principles of wood preservation, and preservatives and treatments suggested for common purposes, including the protection of timber in the ground, in water, or exposed to the weather, and of boat-building, farm, mine, and housebuilding timber [cf. *R.A.M.*, 28, pp. 102, 317; 29, pp. 70, 596; 30, pp. 398, 552]. Such structural timbers are classified in the following categories: A, those in direct contact with the ground and whose service conditions are comparable to those of poles, fence-posts, and railway sleepers; B, those not in direct contact with the ground, but exposed to the weather or extreme dampness and not protected by well maintained paintwork; C, exposed

to the weather or to extreme dampness, but protected by well maintained paintwork; D, used inside and kept dry. The average retention of coal tar creosote recommended for category A timber is 8 lb. per cu. ft. and for B 5 lb. For pentachlorophenol, copper naphthenate, and zinc naphthenate, the retentions for the four classes, respectively, should be 8, 4, 3, and 3 lb. For zinc chloride, categories B, C, and D, respectively, 1, 0·85, and 0·75 lb.; for chromated zinc chloride and copperized chromated zinc chloride 0·75, 0·64, and 0·5; for zinc meta-arsenite and Wolman salts (tanalith) 0·45, 0·4, and 0·35; for greensalt and celcure 0·5, 0·45, and 0·4; and for Boliden salts 0·5, 0·45, and 0·35 lb. [cf. ibid., 29, p. 546]. Boric acid is recommended for category D only (0·2 lb.). In appendix II are given the absorption and penetration requirements typical of American practice (and similar retentions are suitable for New Zealand). The minimum net retention of creosote [cf. ibid., 28, pp. 102, 149; 29, pp. 2, 289; 30, p. 353] required for southern yellow pine [*Pinus* spp.] piles for marine use is 18 to 22 lb. per cu. ft.; for Douglas fir [*Pseudotsuga taxifolia*] piles for marine use 12 to 16 lb.; for southern yellow pine piles for land or fresh water use 12 lb. (other species, usually 16 lb.); for southern yellow pine and red pine [*Pinus resinosa*] poles and Douglas fir piles (land or fresh water) 8 to 12 lb.; for Douglas fir timber under 5 in. thick (land or fresh water) 10 lb.; for lodgepole pine [*P. contorta* var. *latifolia*], jack pine [*P. banksiana*], and Douglas fir poles, southern yellow pine and Douglas fir sleepers and timber over 5 in. thick for land or fresh water use 8 lb.; for lodgepole and other pine round posts 6 lb.; for other timber for sleepers or land or fresh water use 5 to 10 lb.; and for western red cedar [*Thuja plicata*] poles 4 lb.

Jenkinson (J. G.) & Glynne Jones (G. D.). **Control of Cauliflower mosaic virus.**—*Nature, Lond.*, 168, 4269, pp. 336–337, 1951.

Experiments on the control of cauliflower mosaic virus [*R.A.M.*, 30, p. 14] at Seale Hayne College, Devon, with the varieties of broccoli, Extra Early, A6, and B1, grown in two seed-beds, one adjacent to an infected broccoli crop and the other half a mile from any *Brassica* crop, have shown that infection in the seed-bed can be the main cause of the reduced yield even when there are optimum conditions for virus infection in the field. There was no difference in varietal susceptibility and the usual virus symptoms developed in most plants, though those started in the isolated seed-bed were more fruitful, producing 81 per cent. of curds more than 2 in. in diameter and an average total yield per plot of 49·5 lb. compared with 44 per cent. and 36 lb. for those transplanted from the non-isolated seed-bed. Application of a systemic insecticide gave excellent control of the aphid vector *Brevicoryne brassicae*, but failed to inhibit virus transmission.

Plant (W.). **The control of 'whiptail' in Broccoli and Cauliflower.**—*J. hort. Sci.*, 26, 2, pp. 109–117, 3 pl., 1951.

This paper brings together experiments and observations made in south England and Wales and at Long Ashton Research Station, Bristol, since 1947 on whiptail of cauliflower and broccoli (molybdenum deficiency) [*R.A.M.*, 30, p. 255]. All varieties observed in the field appeared to be susceptible. Affected plants contained 0·02 to 0·08 p.p.m. molybdenum, as against 0·12 to 6 p.p.m. for healthy ones. It is possible to correct shortage of molybdenum in the foliage of field plants by using molybdate sprays, the first of which must be applied not later than August, the number of sprays required depending on the amount of the deficiency. Winter sprays are ineffective. The data indicate that the effect of lime [ibid., 30, p. 8] is not due to molybdenum supplied as an impurity but to the action of the lime in increasing the availability of molybdenum in the soil, particularly at pH values above 6·5. At the same time lime is also instrumental in reducing the manganese content in the plant.

Anderson (A. L.). **Bacterial diseases of Michigan Navy Pea Beans.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 33, 3, pp. 199–200, 1951.

Isolations from 55 samples of the 1949 crop of navy pea beans [*Phaseolus vulgaris*] from nearly as many localities in Michigan showed that *Xanthomonas phaseoli* var. *fuscans* [*R.A.M.*, 27, p. 510] accounted for 74·5 per cent. of the isolates, *X. phaseoli* [ibid., 29, p. 600] for 9·4 per cent., and *Corynebacterium flaccumfaciens* [loc. cit.] for 3 per cent.; non-identified, weakly parasitic bacterial isolates amounted to 13·1 per cent. This is the first record of fuscous blight of beans from Michigan.

Brock (R. D.). **Resistance to angular leaf spot among varieties of Beans.**—*J. Aust. Inst. agric. Sci.*, 17, 1, pp. 25–30, 1951.

Angular leaf spot of beans (*Phaseolus vulgaris*) caused by *Isariopsis griseola* occurs in Queensland, New South Wales [*R.A.M.*, 22, p. 91], and Victoria. Losses are greatest in seed crops, and in 1948–9 the disease was regarded in New South Wales as the most important disease affecting seed crops on the south coast. In pot tests 164 lines of beans were inoculated with one isolate of the fungus by atomizing the first pair of foliage leaves (after removing all others) with a macerated culture suspension and incubating in a humidity chamber for three days. The number of lesions, percentage necrosis, and amount of defoliation were recorded. Those varieties showing resistance were tested further for first leaf and trifoliate leaf reactions, using a mixture of 13 isolates. No defoliation or typical spore-bearing lesions on the trifoliate leaves and very few typical lesions on the first leaves occurred on the varieties Alabama No. 1, Cafe, California Small White, Case Knife (or Erecta, which is a variety of *P. multiflorus*), Epicure, Mexico Black, McCaslan, Navy Bean, Negro Costa Rica, Scotia, and Rojo Chico, and these, accordingly, are classed as highly resistant. In the resistant class were 19 varieties. All eight varieties of Lima bean [*Phaseolus lunatus*] tested were susceptible or very susceptible. Several of the resistant varieties are also resistant to halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) and anthracnose (*Colletotrichum lindemuthianum*) [ibid., 25, p. 483].

Wade (G. C.). **Pea diseases in Tasmania.**—*Tasm. J. Agric.*, 22, 1, pp. 40–48, 8 figs., 1951.

The most serious pea disease in Tasmania is *Mycosphaerella* blight (*M. pinodes*) [*R.A.M.*, 30, pp. 20, 400], the collar rot phase of which causes heavy losses. Other diseases include *Ascochyta* leaf and pod spot [*A. pisi* and *A. pinodella*: loc. cit.]. *Septoria* leaf spot [*S. pisi*: ibid., 27, p. 591] attacks old plants but causes little damage. On seedlings *Pythium* spp. [ibid., 30, p. 19] are the most important fungi in the damping-off complex. Seed treatment with tetroc [ibid., 28, p. 512] at 2 oz. per bush. is recommended. Bacterial blight (*Pseudomonas pisi*) [ibid., 30, p. 91] occurs sporadically in early sown crops. Pea mosaic [ibid., 29, p. 140], to which Canner's Perfection is resistant, and 'pimple pod' are the only virus diseases. The latter is important on canning peas and in some seasons is responsible for severe losses. Canner's Perfection, Wyola, Richard Seddon, and Major are affected, while Greenfeast is tolerant. The symptoms consist of numerous yellow, translucent spots on the strongly puckered leaves and stipules, vein-clearing, and characteristic raised pimples on the often twisted and distorted pods. The peas in 'pimpled' pods frequently exhibit watersoaked, brownish areas on the surface, the colour of which intensifies when cooked. Heavy infections also cause yield reductions. The virus overwinters on volunteer peas, broad beans, and red clover. Volunteer peas should be eliminated and the other hosts not grown in proximity to canning peas. The most practical control measure is to grow the tolerant Greenfeast.

Ling (L.). **Bibliography of Soybean diseases.**—*Plant Dis. Reptr, Suppl.* 204, pp. 111–173, 1951. [Multilithed.]

This annotated list of papers published from 1882 to 1950 on soy-bean diseases and seed-treatment, including a number from the Orient not easily accessible to western readers, comprises 503 titles arranged alphabetically under the authors' names. In an appendix the causal agents with their references and geographical distribution are arranged alphabetically in groups according to their nature. Common names and succinct descriptions of symptoms are given for the most important disorders, and brief diagnoses (taken chiefly from the original descriptions) of the taxonomic characters of organisms described originally as parasites of soy-bean are included.

Newhall (A. G.). **New methods of controlling Onion smut.**—Abs. in *Phytopathology*, 41, 1, p. 28, 1951.

For the control of onion smut (*Urocystis cepulae*) [*R.A.M.*, 28, p. 471] on New York muckland soils, trials have been made successfully for two seasons with a Root hand blower mounted on the handles of the drill and operated by chain drive from the front wheel to blow fungicidal dusts into the open seed furrow as it is being closed. The following gave good control in tests on 30 farms: tersan 10 lb. per acre, the same with a diluent at 20 lb., TMTD (thiram) [ibid., 29, p. 221] plus pyrophyllite (1:2), and orthocide at 15 and 20 lb. per acre. Seed-pelleting with the last-named at 1 lb. per lb. seed was also efficacious. The most promising combination was a 1:4 mixture of tersan plus an insecticide at 22 lb. per acre. Excellent control was also obtained by the admixture of thiram with 5–10–10 fertilizer at 60 lb. per ton, broadcast at $\frac{1}{2}$ ton per acre and harrowed lightly into the top inch of soil.

Nelson (R.). **Michigan State Green-Gold: a new Celery resistant to Fusarium yellows.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 33, 3, pp. 280–285, 2 figs., 1951.

In breeding work at Michigan State College a light green hybrid celery that is highly resistant to *Fusarium apii* [*R.A.M.*, 17, p. 8] has been developed from the Downing strain of Fordhook and a tall selection of Michigan Golden. It is of good quality and is suitable for cultivation in Michigan either as a summer- or an autumn-maturing variety. It is named Michigan State Green-Gold and seed is available for commercial use.

Friedman (B. A.). **Control of decay in prepackaged Spinach.**—*Phytopathology*, 41, 8, pp. 709–713, 1951.

In studies at the Division of Fruit and Vegetable Crops and Diseases, U.S. Department of Agriculture, New York, bacterial soft rot (*Erwinia carotovora*) was found to be the principal cause of decay and reduction in saleability of prepackaged spinach [*R.A.M.*, 24, p. 88]. Although the addition of inorganic and organic chlorine compounds to the wash water reduced the numbers of bacteria in the water and on the leaves, it failed to control the rot or extend the period of saleability. More thorough centrifugal drying of washed spinach reduced the incidence of decay and prolonged the period of marketability, but the best results were obtained by refrigeration of the pre-packaged product (in sealed but perforated bags) in perforated shipping cartons in a vacuum chamber under a vacuum of 4·5 mm. mercury; in about five minutes the temperature at the centre of the bags had fallen from 79° to 32° F.

Ellis (D. E.) & Cox (R. S.). **The etiology and control of Lettuce damping-off.**—*Tech. Bull. N.C. agric. Exp. Sta.* 94, 33 pp., 9 figs., 2 graphs, 1951.

Studies carried out from 1940 to 1947 at North Carolina Agricultural Experiment

Station on the cause and control of lettuce damping-off in North Carolina are summarized. The organism most frequently associated with typical post-emergence damping-off was *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 25, p. 23; 30, p. 452], and it was shown by inoculation tests to cause both this and the pre-emergence phase of the disease. *Pythium* spp. [loc. cit.] were more frequently associated with root rot than with post-emergence damping-off. Of 24 pathogenic isolates of *Pythium* (many were non-pathogenic), 17 were *P. debaryanum*, three were *P. spinosum* [cf. ibid., 20, p. 469; 21, p. 344], and four were tentatively determined as *P. irregulare*. Some of these isolates caused pre-emergence damping-off and root rot, but only occasionally were responsible for post-emergence failure.

From the results obtained in experiments on control [ibid., 30, p. 134] it is recommended that lettuce seed be treated with either 2 per cent. cuprocide or 0·62 per cent. spergon and that a drench of fermate or thiosan (both 1 in 100) [cf. ibid., 30, p. 259] be applied to the beds at the rate of ½ gal. per sq. yd. at ten-day intervals from time of seeding until the plants are ready for transplanting.

Broadbent (L.). **Lettuce mosaic in the field.**—*J. Minist. Agric.*, 57, 12, pp. 578–582, 1951.

Lettuce mosaic virus [*R.A.M.*, 29, p. 247; 30, p. 181] occurs in most parts of Britain, but is especially important in the south where it commonly causes losses of 25 per cent. or more. Incidence was exceptionally severe in 1935, 1944 [ibid., 28, p. 110], 1948, 1949, and 1950. Up to 15 per cent. of the viable seed produced by infected lettuce plants may give rise to mosaic plants. In fields kept under observation in Buckinghamshire crops with 1 per cent. initial seed-borne infection contained by harvest 3 to 40 per cent. infected plants, depending on aphid infestation. In addition to *Myzus persicae* [ibid., 29, p. 247], *Macrosiphum euphorbiae* transmits the virus. The disease was carried by aphids from infected winter lettuce to early spring crops, which suffered severely, and from these to early summer crops. Later ones suffered less owing to scarcity of aphids. One grower omitted winter lettuce and planted all the spring crop from frames in one large block, placing his first and later drillings in widely separated large blocks. Although both blocks became heavily infested with aphids during the spring, little virus was introduced, whereas on other holdings in the same area some of the spring and early summer crops failed completely.

The control measures include the production of virus-free seed and the isolation of frames in which seedlings are to overwinter, seed-beds, and winter crops as far as possible from other lettuce; transplants should be dipped in a nicotine solution and winter crops treated with an insecticide during late November; lettuce crops should be in large, widely separated blocks; diseased, unsaleable crops and crop residues should be destroyed as soon as possible.

Kulkarni (Y. S.), Patel (M. K.), & Abhankar (S. G.). **A new bacterial leaf spot and stem canker of Pigeon Pea.**—*Curr. Sci.*, 19, 12, p. 384, 1950.

A new bacterial disease of pigeon pea was first observed at Julgaon and Anand [Bombay] in September, 1949. In studies at the Agricultural College, Poona, where ideal conditions for the pathogen were provided, circular, watersoaked spots, 0·5 mm. in diameter, were formed on the leaves after an incubation period of seven days. As they expand the lesions become quadrilateral (1 mm.) and are surrounded by a halo on the upper leaf surfaces. The initially light brown spots later turn dark brown and are raised on the upper surface in consequence of the desiccation of the bacterial exudate. Lesions 2 mm. in diameter may be formed by coalescence of the spots, which in severe cases occur all over the leaf and petiole and induce general yellowing and eventual shedding. The dark brown cankers produced on the main stem and lateral branches cause decortication if present in sufficient numbers.

The causal organism, *Xanthomonas cajani* sp., is a capsulated, non-acid-fast rod, staining readily with common dyes and measuring 1·3 to 2·2 by 0·9 to 1·4 μ. On potato dextrose agar plates the colonies are smooth, glistening, with entire margins, naphthalene yellow (Ridgway), reaching a diameter of 1·5 cm. in seven days; on nutrient agar they are circular, shining, slightly raised, baryta yellow, and reach 7 mm. in four days. Litmus is reduced, gelatin liquefied, casein digested, and starch hydrolysed; ammonia is produced, nitrates are not reduced; Loeffler's solidified blood medium is liquefied in ten days; fair growth is made in Koser's liquid and solid citrate media. The optimum temperature for the development of the pathogen is 30° C. and its thermal death point 51°.

CAPOOR (S. P.) & VARMA (P. M.). **Yellow vein-mosaic of Hibiscus esculentus L.**—*Indian J. agric. Sci.*, 20, 2, pp. 217–230, 3 pl., 1 diag., 1950.

Yellow vein mosaic [*R.A.M.*, 22, p. 161] is ubiquitous throughout Bombay Province [ibid., 29, p. 406] and is a major limiting factor in the production of bhendi (*Hibiscus esculentus*). A late attack reduces the fruit yield by over 25 per cent. and an early one may cause a total loss. The virus is not transmitted through sap or seed or by dodder (*Cuscuta reflexa*). It is, however, readily transmitted by grafting and by the white fly, *Bemisia tabaci*, but not through the eggs to the offspring of viruliferous flies. The host range, limited to the Malvaceae, includes *H. abelmoschus*, *H. moscheutos*, *Althaea rosea*, and the common weed *H. tetraphyllus*, which harbours the virus in nature. *H. cannabinus* and *H. sabdariffa* are infected only by tissue union. The vector was unable to transmit the virus to these plants but successfully infected *H. esculentus* after feeding on them. Partial recovery from the disease was common in *H. cannabinus* and *H. sabdariffa*, but only one plant of the latter recovered completely.

For control the author recommends the eradication of *H. tetraphyllus*, spraying the crop once every three weeks with fish oil rosin soap to control the white fly population, and keeping the fields clear of weeds. *Ochrovena hibiscae* n.gen., n.sp. and *Hibiscus* virus 1 are the names proposed for the virus.

CAPETTA (G. B.). **Ricerche sulle condizioni ecologiche per l'insorgere dell' epidemia da oidio nella Vite dell' Oltrepò pavese.** [Researches on the ecological conditions necessary for outbreaks of epidemics of Vine *Oidium* in the Pavia area of the Po valley.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, 8, 5, pp. 231–242, 1 map, 1951.

A study of the ecological data obtained by the observatories in the Po valley [cf. *R.A.M.*, 30, p. 505] during the years 1948 to 1950 inclusive, in relation to outbreaks of *Oidium* [*Uncinula necator*: ibid., 29, p. 8], showed that infection occurs at about 6° C., the temperature at which the shoots develop. Sulphur treatments should therefore begin early, especially in vineyards where severe infection has occurred in previous years, as the fungus overwinters on the buds [ibid., 16, p. 794]. Outbreaks are favoured particularly by low atmospheric humidity alternating with slight rain [cf. ibid., 15, p. 587]. The incubation period is about six days; hence, in periods when attacks tend to become epidemic, treatments should be repeated every six days. The optimum temperature for the disease is 20° to 25° and the minimum 6° to 7°.

DÉMÉTRIADÈS (S. D.). **Notes phytopathologiques I.** [Phytopathological notes I.]—*Ann. Inst. phytopath. Benaki*, 4, 1–2, pp. 47–53, 1 fig., 1950.

In November, 1939, there was a severe attack of *Sclerotinia sclerotiorum* [*R.A.M.*, 30, p. 207] on potatoes near Thebes, Greece. In the morning the plants appeared perfectly healthy but by the evening the leaves had wilted completely, yellowish-brown lesions were evident in the collar region, and the large, immature tubers bore

brown to violet spots. This is the first report of *S. sclerotiorum* attacking potato in Greece.

Towards the end of April, 1943, a bed of chicory growing at the Phytopathological Institute, Benaki, was severely damaged by a disease characterized by whitish, more or less circular spots 1 to 5 mm. in diameter which destroyed the leaves. On the midrib the lesions sometimes reached a length of 10 mm., the whitish surface being encircled by a light brown margin. Finally only the midrib remained. The pathogen, with spores up to 23 μ long, was identified as *Ramularia lampsanae*, a new record for Greece.

Melampsora allii-populina [ibid., 27, p. 115] was present in poplar nurseries on the outskirts of Athens in October, 1950, the first record of this species on poplar in Greece.

Samples of lucerne bearing warts of *Urophlyctis alfalfae* [ibid., 30, p. 125; C.M.I. map No. 130], not previously reported in the country, were received in April, 1950. The disease was reported to be present in several villages on the Agrinion plain and to have occurred every year since 1940 at least, appearing at the beginning of February and disappearing in May when the crop is cut. Subsequent growth is not affected. It is estimated that 200 ha. were attacked in 1950, amounting to a loss of 140,000,000 drachmas. Improved soil drainage and crop rotation should control the disease.

Annual Report East African Agriculture and Forestry Research Organization, 1950. —57 pp., [? 1951].

In the plant pathology section (pp. 18–28) of this report [cf. *R.A.M.*, 30, p. 140] R. F. W. Nichols, dealing with virus diseases of cassava [loc. cit.], states that in the past emphasis in selection has been on resistance as opposed to tolerance, but there now seems to be justification for testing clones that may carry a factor for high yield despite susceptibility to mosaic. In some tolerant inter-specific hybrids, particularly those of Ceara origin [ibid., 27, p. 63], reduction in yield from mosaic is less than in ordinary clones. Production of tolerant clones is justifiable as an interim measure on the ground that should resistance break down then a series of high-yielding if susceptible clones would immediately be available to replace them. Except under certain conditions reduced yield is not a common feature of brown streak, but the quality of the roots is impaired to a degree that depends on the tolerance of particular clones and on climatic conditions. Symptoms show a wide variation between apparent field immunity and the development of numerous necrotic root lesions; in severe cases leaf and stem symptoms are also present. Low temperatures so aggravate the effects of the disease that very intolerant clones may be killed [ibid., 29, p. 400]. It is probable that climatic conditions other than temperature can intensify symptom expression. The high-yielding Ceara-cassava hybrid no. 4332/2 was for three consecutive years only mildly affected on the plains in the Tanga district, Tanganyika, where temperatures are relatively high even in the cool season. In 1950, however, the roots of individual plants were so severely affected that they lost all food value. During the same period symptom expression was markedly severe in other localities also, and the feature common to all was severe drought.

H. H. Storey and Mrs. A. K. Ryland, continuing their investigations into groundnut rosette [ibid., 30, p. 141], found that in the Urambo area of Tanganyika the virus is carried through the dry season by volunteer plants from seeds left behind after harvest. However, the survival and spread of the virus vary from year to year, probably because changes in the weather affect the insect vector (*Aphis craccivora*) and its natural enemies. Trials with a new systemic insecticide showed that although viruliferous aphids were killed they nevertheless infected the plants with rosette. There was, however, no secondary spread of the virus.

The practical value of the treatment, apart from the cost, therefore depends on the relative importance of primary and secondary spread.

Work by D. Rudd Jones on cypress canker (*Monochaetia unicornis*) [loc. cit.] demonstrated that infection is facilitated by misty conditions. The cankers start to elongate about one month after the long rains commence. In severe attacks the cracking and drying out of the cankered tissue in the dry season may result in complete ring-barking and death of the tree. That *Cupressus macrocarpa* is much more susceptible that *C. lusitanica* was confirmed over a wide range of sites. Plantation experiments showed that if all infected *C. macrocarpa* trees are removed the number of new infections of *C. lusitanica* is greatly reduced. There would appear to be good reason to abandon the cultivation of *C. macrocarpa*. There are two distinct strains of the fungus in culture, (A) virulent, fast-growing, and producing few spores, and (B) less virulent, slow-growing, and with abundant spores.

In work on sudden death of cloves [ibid., 30, p. 580] in Zanzibar by F. J. Nutman *et al.* (pp. 38–41) attempts at mechanical and insect transmission of the disease did not result in infection. Of the fungi associated with roots of sudden death trees, one, as yet unidentified, caused spectacular symptoms of sudden death in clove seedlings.

Wright (J.). **Investigations 1949–1950.**—*Bull. Dep. Agric. Jamaica* (N.S.) 47, 127 pp., 1951.

In the plant pathology section (pp. 68–70) of this report [cf. *R.A.M.*, 30, p. 309] the following are recorded for the first time on economic hosts in Jamaica: *Cercospora zebrina* causing leaf spot of lucerne, *Erysiphe* (?) *polygoni* on cabbage, *C. carotae* on carrots, and *Diplocarpon earliana* on strawberry leaves. *Septobasidium lepidosaphis* was identified on the insect *Lepidosaphes beckii* on citrus leaves.

The sugar-cane variety B. 34104 is particularly susceptible to eyespot (*Helminthosporium sacchari*) [ibid., 30, p. 246], which is aggravated by potash deficiency.

Abnormal weather in February was responsible for another bad outbreak of late blight (*Phytophthora infestans*) in most tomato-growing areas, especially in the higher parts, such as South St Elizabeth. Early blight (*Alternaria solani*) [ibid., 3, p. 488] caused a certain amount of fruit damage both in May and in conjunction with the late blight attack.

Robbins (W. J.) & Hervey (Annette). **Contaminating bacteria in plant tumor tissues.**—*Science*, 114, 2961, pp. 322–323, 1951.

In the investigations at Columbia University and the New York Botanical Garden various plant tissues, both normal and tumorous, which appeared to be bacteria-free when grown on a mineral salts medium with added vitamins, were shown to harbour bacteria when grown on a proteose-peptone-vitamin medium.

White (P. R.). **Les tumeurs végétales et le problème de l'étiologie cancéreuse.** [Plant tumours and the problem of cancerous etiology.]—*Ann. biol.*, Sér. 3, 26, 12, pp. 745–761, 5 figs., 1950.

Many of the 63 contributions listed in the bibliography appended to the discussion herein presented on the possibility of an etiological connexion between crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens*) and human and animal cancer have been noticed from time to time in this *Review*.

Sabet (K. A.) & Dowson (W. J.). **Action of phytopathogenic bacteria on pectate gel.**—*Nature, Lond.*, 168, 4275, p. 605, 1951.

At the Botany School, Cambridge, a specially prepared sodium pectate gel has

been used successfully for determining the pectolytic abilities of plant pathogens [*R.A.M.*, 29, p. 252]. The advantages of the medium, the preparation of which is described, are that it sets rapidly, the action of the bacteria is amplified by the presence of sodium asparaginate, which most of the organisms can utilize as an extra source of carbon and nitrogen, and no adjustment of pH is needed, provided that the sodium pectate used is neutral or slightly alkaline. A slight to moderate liquefaction and full thick liquid were produced by *Pseudomonas syringae*, its f.sp. *populea*, *P. mors-prunorum*, *P. angulata*, *P. tabacum*, and *P. medicaginis* f.sp. *phaseolicola* and the medium became alkaline. *P. fluorescens* did not liquefy the medium although it grew readily in it. *Xanthomonas campestris* and *X. citri* caused moderate liquefaction to a clear liquid, *X. malvacearum* and *X. begoniae* a slight thick liquefaction, the medium remaining neutral. *Corynebacterium fascians*, *C. tritici* [formerly *P. tritici*: ibid., 26, p. 446], *C. michiganense*, and *C. flaccumfaciens* produced slight to moderate liquefaction, thick liquid, and slight alkalinity. With *Bacterium* [*Erwinia*] *aroideae*, *B. carotovorum* [*E. carotovora*], and *B. phytophthorum* [strain of *E. carotovora*] there was moderate liquefaction, semi-transparent liquid, and acid reaction. *B. salicis* produced less liquefaction, thicker liquid, and no change in pH, *B. tumefaciens* giving slight liquefaction, still thicker liquid, and alkalinity. The saprophyte *B.* [*E.*] *lathyri* did not liquefy pectate gel.

URQUHART (D. H.) & DWYER (R. E. P.). **Report on the prospects of extending the growing of Cacao in the Territory of Papua and New Guinea.**—39 pp., 11 figs., 4 maps (1 col.), Bournville, Cadbury Brothers Ltd., 1951. 5*s*.

The chief diseases of cacao in New Guinea are root rots [*Fomes lignosus*, *F. noxius*, *Sphaerostilbe repens*, *Ganoderma pseudoferreum*, and *Armillaria mellea*: *N. Guinea agric. Gaz.*, 4, 4, pp. 49–52, 1938; *R.A.M.*, 4, p. 265; 16, p. 669], chupon wilt (*Diplodia* [*Botryodiplodia*] *theobromae*) [cf. ibid., 14, p. 567; 30, p. 181], die-back associated with *B.* spp., anthracnose pod canker (*Gloeosporium* spp.) [ibid., 14, p. 567], pod rot (*Phytophthora palmivora*) [loc. cit. and cf. ibid., 16, p. 660], pink disease (*Corticium salmonicolor*) [C.M.I. map No. 122], white stem disease (*Ustulina zonata*), and thread blights due to *Corticium* or *Marasmius* sp., but not witches' broom [*M. perniciosus*: ibid., No. 37]).

URQUHART (D. H.). **Prospects of the growing of Cacao in the British Solomon Islands, with notes on Malaya, Ceylon, and Java.**—44 pp., 39 figs., 4 maps, Bournville, Cadbury Brothers Ltd., 1951. 5*s*.

In Ceylon the author was informed that most of the deaths in cacao plantations were due to 'canker' following attack by *Phytophthora* [? *palmivora*: *R.A.M.*, 8, p. 527]. Recently sickle leaf [? zinc deficiency: cf. ibid., 30, p. 459] has been fairly common and is usually associated with a semi-transparent leaf-clearing, this being also the symptom of another condition known locally as 'okra leaf.' The latter is common on dadap [*Erythrina lithosperma*] shade trees. Die-back in the form of tip-withering of old and sometimes young trees [ibid., 27, p. 555] is fairly common; one planter stated that he had cured the condition by careful cultivation and pruning and by increasing shade.

P. [? *palmivora*: ibid., 4, p. 149] is rather common in Java.

WATROUS (ROBERTA C.). **Cacao. A bibliography on the plant and its culture and primary processing of the bean.**—*Libr. List U.S. Dep. Agric.* 53, 49 pp., 1950. [Mimeoprinted.]

This bibliography of publications of the period 1920 to 1949 on the cacao plant and bean includes a section on diseases (pp. 23–29).

Boasso (Celia S.) & Levine (M. N.). **Leaf rust of Wheat, Puccinia rubigovera tritici, in Uruguay.**—*Phytopathology*, 41, 8, pp. 736–741, 1951.

A preliminary study has revealed the existence in Uruguay of a greater variety and complexity of physiologic races of *Puccinia triticina* on wheat [*R.A.M.*, 11, p. 704] than has been recorded for the neighbouring countries, Brazil [ibid., 28, p. 12], Argentina [ibid., 30, pp. 513–514], and Chile [ibid., 30, p. 148]. Of the 27 or more races represented in Uruguay, Nos. 10 and 31 predominated, each constituting 9·7 per cent. of the total number of isolates identified and each being endemic in three of the four provinces. Next in frequency came 50, 52, and 86, each constituting 7·5 per cent. of the total number of isolates identified but less widely distributed than 10 and 31. The frequencies of races 20 and 37 were 6·5 and 5·4 per cent., respectively.

Physiologic races bearing the same numerical designation are often not identical genetic entities and additional differential varieties [ibid., 30, p. 561] may bring to light sharp deviations in their infection pattern. Thew, for instance, is rarely used but is capable of screening out biotypes or even of distinguishing physiologic races. Biotypes of races 11 and 15 may be detected by Gabo and Lee, which might well prove useful in Uruguay either as commercial or parental material. The same is largely applicable to Cappelli, which has shown an extraordinary degree of resistance to all the 29 Upper Midwest races [see next abstracts] tested to date. It has, however, occasionally sustained severe damage from *P. triticina* in Mexico [ibid., 28, p. 623].

Levine (M. N.), Ausemus (E. R.), & Stakman (E. C.). **Wheat leaf rust studies at Saint Paul, Minnesota.**—*Plant Dis. Reptr, Suppl.* 199, pp. 1–17, 1951. [Multilithed.]

This report summarizes the results of three lines of investigation into wheat leaf [brown] rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: see preceding and next abstracts] carried out at the University of Minnesota. Records of the occurrence and distribution of physiologic races [loc. cit.] isolated from specimens collected in the Upper Midwest area of the United States from 1925 to 1949, inclusive, showed that 48 races were present, the most common being 9, 128, 126, 5, and 15, in that order [*R.A.M.*, 29, p. 91]. The seedling reaction under greenhouse conditions of over one hundred wheat varieties to the different races enabled biotypes of some of the races to be distinguished. It is suggested, therefore, that more than one isolate of a race should be used for testing. Apulia × Progreso (C.I. 12587), Capelli (C.I. 12452), Exchange (12635), Gabo (12795), Klein Titan (12615), La Prevision 25 (12596), McMurachy-Exchange × Redman (12832 and 12833), Premier × Bobin-Gaza (12821), Timophee (11802), Timstein × Newthatch (12634), Wabash × American Banner-outcross (12876), and Warden × Purkof have so far remained resistant in the seedling stage to the races tested on them to date. Of 71 wheat varieties tested in field plots at University Farm during one or more of the years 1938 to 1947, inclusive, eight considered highly resistant in 1944 have shown very little resistance since. Certain durum varieties (Acme, Kubanka, Mindum and Spelmar), however, have retained their resistance. The spring wheats Frontana, Klein Titan, Lee, and McMurachy-Exchange × Redman have proved highly resistant to many races in both the seedling and adult stages and are being used extensively for breeding [ibid., 25, pp. 10, 297, 300; 27, pp. 12, 120].

Johnston (C. O.) & Levine (M. N.). **Physiologic races of the leaf rust of Wheat (Puccinia rubigo-vera tritici) in the United States in 1950.**—*Plant Dis. Reptr*, 35, 7, p. 301, 1951. [Multilithed.]

In studies by the United States Department of Agriculture and the Kansas and

Minnesota Agricultural Experiment Stations 1,195 isolates of wheat leaf [brown] rust (*Puccinia rubigo-vera tritici*) [*P. triticina*: see preceding abstracts], collected in 1950 from 30 States and 214 localities and analysed in the greenhouse, were made up of 33 physiologic races. However, only six of these exceeded 5 per cent. of the total number of isolates, race 5 being by far the most abundant, representing 24·8 per cent. of all isolates and appearing in all but three of the States. Race 9 was next in prevalence, particularly in the Great Plains, south central, and south eastern areas, followed by 216 which is increasing rapidly, especially in the hard red winter and spring wheat areas. Races 15, 58, 21, 11, and 93 were important in certain local areas.

Naumova (Mme N. A.). Влияние температурных условий роста яровой пшеницы на поражаемость ее бурой ржавчиной. [The effect of temperature on the susceptibility of spring Wheat during the growth period to brown rust.]—Бот. журн. [*J. Bot. U.S.S.R.*], 36, 1, pp. 39–46, 1951.

As a result of field tests at Leningrad, Rostov-on-Don, Bezenchuk, and Irkutsk wheat varieties were classified according to their resistance to brown rust (*Puccinia triticina*) [*R.A.M.*, 15, p. 562; 29, p. 296; 30, p. 151] into three groups: highly resistant, fairly resistant, and those, such as Marquis, Hope, Garnet, Thatcher, *turcicum* 23819, *lutescens* 22711, *lutescens* 062, and *hordeiforme* 027, whose susceptibility varied greatly with the external temperatures during the early growth period. At the Pan-Soviet Institute for Plant Protection, Leningrad, the effect of different sowing dates upon the resistance of the above mentioned varieties to two races, 20 and 17, of the rust was studied in the greenhouse. It was found that there was a correlation between temperature during early phases of development and resistance during earing. This relationship was clearer for race 20 than for 17. During the early phases low or moderate temperatures caused an improved resistance to rust while high temperatures increased susceptibility. When the average temperatures during the shooting and tillering period did not exceed 8·7° C., the varieties Marquis, Garnet, and Hope were highly resistant, but they became extremely susceptible when these temperatures exceeded 13·1° to 16·9° (Marquis), 13·4° (Hope), and 13·1° (Garnet). Thatcher, *hordeiforme* 027, *turcicum* 23819, and *lutescens* 22711 tended to resist the disease during earing when the average temperature during their early development did not exceed 5° to 15°, but showed an increased susceptibility at 13° to 18°. Further studies are needed to establish the critical average temperature for each variety.

Klaptsova (Mme N. K.). Новый способ получения культуры головневого гриба ustilago (pers.) rostr. [A new method of obtaining cultures of loose smut, *Ustilago tritici* (Pers.) Rostr.].—Бот. журн. [*J. Bot. U.S.S.R.*], 35, 5, pp. 512–513, 1951.

Investigations were carried out at the Pan-Soviet Institute for Plant Protection, Leningrad, into the culture of *Ustilago tritici* [*U. nuda*: *R.A.M.*, 27, p. 13] from wheat. The spores are noted for their slow germination under artificial conditions [ibid., 6, p. 221]. Since they grow on the flowering wheat-ear in the fields, spores were sown in water extracts prepared from green spring ears on the point of flowering. They produced groups of vigorous promycelia, while those sown in tap water developed single tubes only. Single spores were considerably weaker than groups clustered together. When drops of spore suspension were placed on slopes of potato glucose agar made with the extract and kept at 25° to 28° C., long promycelia developed in two days, and after six to ten days the vigorous mycelium fragmented into shorter, curved portions. When the surface of the agar was covered by a thin white coating of mycelium this disintegration was pronounced

and marked the beginning of chlamydospore formation [ibid., 5, p. 152], accompanied by a change in colour from white to brown.

McKinney (H. H.) & Fellows (H.). **A method for inoculating varietal test nurseries with the Wheat streak-mosaic virus.**—*Plant Dis. Reptr*, 35, 6, pp. 264–266, 1951. [Multilithed.]

The following method, based on that of Richards and Munger [*R.A.M.*, 24, p. 265], was developed at the Kansas Agricultural Experiment Station in co-operation with the United States Department of Agriculture, for the large-scale field testing of wheat varieties for reaction to the streak-mosaic strain of wheat mosaic virus [ibid., 30, p. 25]. The virus, derived from the original collection made near Salina, Kansas, in 1932, was increased in Michigan Amber and Westar wheat. The inoculum was prepared from 80 gm. fresh turgid mosaic leaves and 1,440 ml. water. The finely chopped tissues are mixed with half the water, squeezed through fine gauze, and the residue put in a Waring type blender with the remaining water for two minutes. After squeezing through gauze again the two batches of liquor combined contain about 72 to 77 gm. juice and fine solids. Celite abrasive is added to the inoculum at the rate of 2 gm. per 100 ml.

Excellent results were obtained by spraying small plant populations with a De Vilbiss No. 15 atomizer and quickly drawing the leaves between the thumb and forefinger. In large nurseries the plants were inoculated with a De Vilbiss AG spray gun fitted with a No. 290 air cap and an 'F' fluid tip and attached to a 2 qt. Mason jar containing inoculum. One operator attends to the compressor and holds the jar while the other sprays the plants. Air pressure is maintained at 25 to 30 lb. per sq. in. The amount of inoculum ranges from 5 to 11 ml. per ft. of row, depending on the size of the plants.

In tests on Michigan Amber wheat grown in greenhouses at Beltsville, Maryland, this method, using the inoculum at whole or half strength, has rarely failed to infect 100 per cent. of plants at the first to third tiller stages. When no abrasive was used from 68 to 100 per cent. of the plants became infected. In an autumn-sown nursery at Manhattan, Kansas, inoculated in April, 1950, all the 35 varieties developed mosaic in from 80 to 95 per cent. of the plants. In another autumn-sown nursery inoculated in October, 1950, mosaic was present in each of the 81 varieties examined in April, 1951, 95 to 100 per cent. of the plants being affected.

Rosen (H. R.) & Murphy (H. C.). **Race 55 or 101 of crown rust of Oats which attacks Victoria and Bond derivatives.**—*Plant Dis. Reptr*, 35, 8, pp. 370–371, 1951. [Multilithed.]

The race of oat crown rust (*Puccinia coronata*) recently reported from the United States [*R.A.M.*, 30, p. 606] as resembling the Argentine race 55 [ibid., 23, p. 258] may be designated 55 or 101 according to the reliance placed on the reaction of the differential variety Ruakura. Vallega [loc. cit.] found the latter resistant, but the writers proved it to be susceptible to rust collections which otherwise produce reactions very similar to those described by Vallega for race 55. Because of its variable reaction Ruakura will probably be dropped from the list of differentials. Of 58 crown rust collections made in 1950 from nearly all the important oat-growing counties of Arkansas 51 included the new race.

The mean type reactions to race 101 of seedlings kept at approximately 70° F. in a greenhouse were: completely susceptible, Hawkeye, Anthony, Sunrise, Green Mountain, White Tartar, Appler, Sterisel, Belar, and Bond; susceptible, Ruakura, Green Russian, and Victoria; and highly resistant, Glabrota. On a new set of differentials they were: completely susceptible, Anthony, Appler, Bond; susceptible, Victoria and Ukraine; resistant to intermediate, Bondvic; resistant, Landhafer; and highly resistant, Santa Fe, Trisperma, and Saia.

Hirschhorn (Elisa). **Grado de estabilidad patógena de líneas monoesporidiales de Ustilago zeae adaptadas a desarrollar en medios que contienen arsénico.** [Degree of pathogenic stability of monosporidial lines of *Ustilago zeae* adapted to growth in media containing arsenic.]—*Cienc. e Invest.*, 7, 9, pp. 425–426, 1951.

In further studies made in the Department of Botany and Plant Pathology, University of Minnesota, on the behaviour of monosporidial lines of *Ustilago zeae* [*U. maydis*] in arsenic-containing media [cf. *R.A.M.*, 29, p. 613] 150 mutants and variants of 17D4 were selected by a dilution method. Of these, 90 fell into the following groups: 30 agreed with 17D4 culturally, 30 were different, both these groups being obtained from media containing sodium arsenite, while the third group, also distinct from 17D4, developed on normal agar. Ten individuals of the first group, taken either direct from arsenite medium or after having been returned to potato dextrose agar for from 3 to 16 generations, when combined with the line 10A4 had lost their pathogenicity to maize temporarily but regained it after growing for 16 generations on potato dextrose agar. The remaining 20 had lost their pathogenicity completely. The variants or mutants of the second group maintained their ability, although somewhat diminished, to produce galls and chlamydospores, even when taken directly from media containing 8,000 to 9,000 p.p.m. arsenic. The 30 mutants of the third group maintained their pathogenicity after growing for four to eight generations on sodium arsenite medium.

Line 10A4 in concentrated arsenical media also produced some sectorial variants which maintained the pathogenicity of the parent, but which differed slightly in cultural characters and growth rate. The 10A4 variants were combined with those of 17D4 in maize and the resulting diplonts exhibited a slight increase in virulence, but the life cycle was the same as in 10A4.

Scossiroli (R.). **Per la conoscenza del nanismo del Mais.** [Information on Maize dwarf.]—*Ann. Sper. agr.*, N.S., 5, 1, pp. 157–177, 4 graphs, 1951. [English summary.]

Detailed observations were made of maize dwarfing, apparently due to a virus [*R.A.M.*, 30, p. 316], in Italy in 1949. In one experimental field there were simple crosses between self-fertilized and free-pollinated flint lines, and between free-pollinated dent (Pfister) and flint (Scagliolo 23A) varieties. All plots of Pfister were severely affected, but there was very slight damage or none on Scagliolo 23A and its hybrids. In a neighbouring experimental field, containing 80 kinds of dent maize, dwarfing was so severe that the whole field was abandoned. As the flint types observed comprised two free-pollinated varieties with a heterogeneous genetic constitution, it may be possible to obtain by crossing and selection lines with greater resistance, and there may be other free-pollinated flint varieties with higher resistance.

In the selection plots at Curno maize self-fertilized over a prolonged period, but not subjected to specific selection, included both highly resistant and susceptible lines derived from one and the same free-pollinated variety.

Townsend (G. R.). **Control of the leaf blight and rust diseases of Sweet Corn.**—*Plant Dis. Reptr*, 35, 8, pp. 368–369, 1951. [Multilithed.]

Maize leaf blight (*Helminthosporium turcicum*) [*R.A.M.*, 30, pp. 226, 607], having been very troublesome to growers of sweet corn in the Lake Okeechobee section of Florida for several years, and rust (*Puccinia sorghi*) [ibid., 10, p. 238; 30, p. 563], having been first noted as severe in a few fields of hybrid varieties in the spring of 1950, were subjected to a control experiment at Belle Glade, Florida, in the spring of 1951. Hybrids of the F.M. Cross variety were dusted with various formulations of dithane Z-78 at the rate of approximately 50 lb. per acre in either

seven or 11 applications between 6th March and 30th April. The disease ratings (from 1 for light to 4 for severe infection) for leaf blight and rust, respectively, for untreated plants were 3·5 and 4, as against 1 and 1 for 10 per cent. Z-78 dust in 11 applications, 3 and 2·25 in seven applications spread over the same period, 1·75 and 1·75 in seven applications in the first 30 days, and 1·75 and 2 in seven applications in the last 25 days; for 5 per cent. Z-78 in 11 applications the figures were 1·5 and 1·75. The difference in yield between the 5 and 10 per cent. formulations was only five crates per acre. The yield of No. 1 grade maize was increased by the treatments by about 60 boxes per acre and the total yield by about 40 boxes. At prevailing prices the gain from the various treatments ranged from $68·5 to $119 per acre, less the cost of the dusts. The most economical schedules would be the 5 per cent. dust over the full period or the 10 per cent. up to the time the maize starts to tassel.

Hoppe (P. E.). **A new technique for incubating seed Corn in cold soil for disease tests.**—*Phytopathology*, 41, 8, pp. 747–751, 2 figs., 1951.

The use of a new method developed at the Wisconsin Agricultural Experiment Station permits extensive germination tests with maize in cold soil without the large refrigeration equipment formerly used for testing seed disinfectants. The crown-wounded kernels are mixed with wet peat soil, heavily infested with *Pythium debaryanum* and *P. ultimum* [*R.A.M.*, 29, p. 361], in a glass tumbler, incubated in an ordinary electric refrigerator at the desired low temperature (4° and 11° C. in these tests) for 5, 10, or 15 days and then sown in pots in a warm greenhouse (18° to 24°), where records are made at the three- to four-leaf stage of growth [cf. ibid., 28, p. 391]. The disinfectants used were arasan and the experimental fungicides No. 640 (zinc copper chromate) and No. 224 (zinc mercury chromate).

A high incidence of decay developed in the unprotected seed in peat soil, reaching 100 per cent. in the 10- and 15-day incubations at both temperatures. Except for the 15-day incubations at 11°, arasan afforded almost complete protection. Other experimental evidence also indicated that a temperature of 11° promoted infection by the fungi concerned [cf. ibid., 22, p. 373] in peat soil; low temperature in itself caused no injury but predisposed the slowly germinating kernels to attack.

Kozlova (Mme V. I.). Шелушение коры цитрусовых и меры, предупреждающие его распространение. [Bark peeling of Citrus trees and control of its spread.] —Докл. Ленина Акад. Сельскохоз. Наук. [*Rep. Lenin Acad. agric. Sci.*], *1951*, 7, pp. 36–40, 1951.

As the result of an investigation including grafting experiments at the Moscow Station for Plant Protection the virus disease causing bark peeling of mandarin trees in an Adzhary plantation in 1949–50 was identified as the A type of psorosis [*R.A.M.*, 30, p. 365]. The B type [ibid., 30, p. 34] was encountered only rarely. This is the first record of citrus psorosis [C.M.I. map No. 65] in the U.S.S.R.

Ciferri (R.). **Bronze leaf of Coconut Palm in the Dominican Republic and Venezuela.**—*Phytopathology*, 41, 8, pp. 765–766, 1951.

The information here presented on the several types of bronze leaf wilt of coconut occurring in the Dominican Republic, Venezuela, Jamaica, and Trinidad has already been summarized from another source [*R.A.M.*, 28, p. 572].

Ramanathan (V.), Ball (D. V.), & Thomas (K. M.). **A review of the past experimental work on Coffee in South India with suggestions for the future.**—56+11 pp., published by the Director of Research, Coffee Research Station, Balehonnur, S. India, 1951. R.I.8.

In an appendix to this publication K. M. Thomas reviews past work on pests

and diseases of coffee in southern India, including that carried out on the control of *Hemileia vastatrix* [*R.A.M.*, 13, p. 229; 30, p. 366] and die-back [ibid., 29, p. 210]. Black rot (*Pellicularia* [*Corticium*] *koleroga*) [loc. cit.] does not constitute a major research problem of immediate economic importance, but any fundamental study on such aspects as how the fungus survives the hot weather should repay its cost. Brown root rot is usually associated with *Fomes noxius* [ibid., 13, p. 229], but in recent work at the Madras University Laboratory species of *Fusarium* also were invariably present.

WELLMAN (F. L.). **Dissemination of Omphalia leaf spot of Coffee.**—*Turrialba Rev. Inst. interamer. Cienc. agric.*, 1, 1, pp. 12–27, 4 figs., 1950. [English summary.]

In experimental plantings at the Inter-American Institute of Agricultural Sciences, Turrialba, Costa Rica, the lesions produced on Arabigo coffee leaves by *Omphalia flavida* [*Mycena citricolor*: *R.A.M.*, 27, p. 132; 30, p. 608] were found to spread from evident old foci of infection, from one part of a tree to another, and in all directions in the field, though the range of movement was narrow. Severity of infection was definitely correlated with the presence of shade over the trees.

Counts on badly diseased trees showed that, in general, the top third of leaves averaged about two spots per leaf, with an estimate of some 10 per cent. defoliation, corresponding to the normal amount of leaf drop on neighbouring healthy trees. In the middle and bottom thirds the average number of spots per leaf was about 10 and 15, respectively, with 55 and 75 per cent. defoliation as against 30 and 40 per cent., respectively. Sheer numbers of spots, however, are not necessarily the most important factor in premature leaf fall, which seems to depend rather on their location. For example, one exceptionally large, well-matured leaf was still firmly attached to its branch notwithstanding the presence of 108 lesions, none of them on a major vein. Spotting, moreover, may be very irregular, as in the case of ten 20-year-old trees, long unpruned, in which infection was extremely heavy on the tips of bent-over branches, averaging over 50 spots per leaf, whereas the tops of upright branches were largely free from lesions.

Under the conditions prevailing in the trial plantings *M. citricolor* was disseminated by means of the 'cabecitas' (small fruit heads), which are believed to represent the imperfect state of the fungus. During the first few minutes after they were placed in water on coffee leaves the 'cabecitas' could be easily floated off, but after a quarter-of-an-hour a small number began to adhere and after 24 hours a high percentage had anchored. In the field progress in the increase of lesion numbers was shown to be entirely dependent on the advent of rainfall and the attendant humid conditions. At the outset of the observations there was an average of about six leaf spots per seedling tree. After a period of 17 days (13 wet) the average daily increase per tree was about 29. A week later, after a cloudy period with intermittent rain, the corresponding figure was 19·6. During the 52-day dry period following, incidence increased by only 4·5 spots daily, while for the next moist, cloudy period of 19 days (11 rainy) there was an increase of 102·4 per cent., and after a further spell of 13 cloudy days, with four wet ones in the early part, the figure rose to 178·2 per cent. During the next six-day period, when rain fell on three days and the afternoons were dull, the lesions increased by 88·9 per cent. daily and in the final ten days (six rainy with cloudy afternoons) by 31·3 per cent.

Effective barriers to the spread of the pathogen are plants of the broad-leaved *Heliconia acuminata*, roadways 10 to 13 m. and upwards in width, pastures, and small fields of cultivated crops.

DUDDINGTON (C. L.). **Further records of British predacious fungi. II.**—*Trans. Brit. mycol. Soc.*, 34, 2, pp. 194–209, 8 figs., 1951.

Further descriptions of British predacious fungi not previously recorded in the

country [cf. *R.A.M.*, 30, p. 466] include *Dactylaria gracilis* n.sp., *Arthrobotrys conoides*, *D. psychrophila*, *Dactylella asthenopaga*, *D. heterospora*, *Acrostalagmus obovatus*, *Cephalosporium balanoides*, *Harposporium oxycoracum*, *Nematoctonus tylosporus*, *Spicaria coccospora*, and *Zoopage thamnospira*, all parasitic on nematodes and *Acaulopage baculispora*, *A. ischnospora*, and *Stylopage rhicnacra*, all capturing amoebae.

Vago (M. C.). **Un nouveau type d'épizootie dans les élevages de Vers à soie.** [A new type of epizoötic in Silkworm cultures.]—*Progr. agric. vitic.*, 135, 17, pp. 232–233, 1951.

In May, 1949, silkworms being raised at Mazac, Gard, France, developed signs of disease, the symptoms of which are described, about one day after the fourth ecdysis, and two days later many were dead. The cocoons from the live ones were useless and discoloured by a red liquid coming from the decomposing silkworms. The digestive tract of the dead insects contained, among other organisms, *Serratia macerans*, while the body fluid contained only this bacillus in almost pure culture. Experimental inoculations of the cavity with haemolymph from diseased insects or with a pure culture gave 91 per cent. infection, but oral transmissions with pure cultures were negative and only occasionally positive when diseased haemolymph was employed.

Ciferri (R.). **Red rot of Sisal in Venezuela.**—*Phytopathology*, 41, 8, pp. 766–767, 1951.

A destructive rot of sisal observed in the Barquisimeto region of Venezuela in 1948 and apparently identical with a disease affecting the same host and *Agave fourcroides* in the Dominican Republic is characterized by a basal discoloration beginning with the bud scales and gradually spreading upwards to the basal leaves. After one or more seasons a soft rot develops in the bud, so that the rosette readily becomes separated from the subterranean stem, leaving only the old peripheral crown attached to the plant. An early symptom of the disease is the cinnabar-red stain in the stem and leaf blades. The disease is freely disseminated by the use of diseased suckers for new plantings, in which the incidence of infection may reach 90 per cent. and upwards, and has been carried from Barquisimeto to Margarita Island, a second Venezuelan sisal centre, while the fields near Pampatal have been practically destroyed since 1947.

The Venezuelan red rot is clearly distinct from the potassium deficiency and basal leaf necrosis of sisal in Brazil [*R.A.M.*, 30, p. 519], the leaf disease of Tanganyika [ibid., 10, p. 382], and the mosaic of the Belgian Congo [ibid., 10, p. 383], and its etiology is problematical. The following reasons for rejecting the implication of a nutrient deficiency in the development of the red rot are that it is introduced by means of suckers from one area to another, its incidence is reduced by propagation with suckers from disease-free mother plants, and it occurs on various types of soil.

Colletotrichum agaves and *Marssonina agaves* [ibid., 25, p. 501] were also observed in the Venezuelan sisal fields, where they are, however, of little economic importance.

Nattrass (R. M.). **A Botrytis disease of Urena lobata in Kenya.**—*E. Afr. agric. J.*, 16, 4, p. 181, 7 figs., 1951.

In July, 1950, a small experimental plot of two-year-old *Urena lobata* shrubs (cultivated in some tropical countries as a bast fibre crop) at the Scott Agricultural Laboratories, Nairobi, was severely affected by a stem canker caused by *Botrytis cinerea* [cf. *R.A.M.*, 28, p. 316]. The cankers, up to 15 cm. long, occurred on the main and lateral stems, the larger ones girdling the stem and causing die-back or

wither tip. They originated in every case at a node, and infection took place through the flower bud. Sclerotia, which formed when pieces of cankered stems were buried for three weeks in moist sand, were plate-like, 1 to 2 mm. broad, with a raised rim when dry, and about 0·2 mm. thick. Spraying unopened flower buds with a conidial suspension resulted in infection.

This virulent disease may render the cultivation of the crop unprofitable.

Simmons (S. A.). **Alternaria leaf spot of Gladiolus.**—*Plant Dis. Reptr*, 35, 7, pp. 333–334, 1 fig., 1951. [Multilithed.]

The fungus isolated from leaf spots on *Gladiolus* [cf. *R.A.M.*, 27, p. 566], causing severe damage in a plantation in Ontario during July, 1949, was identified as *Alternaria fasciculata* Cooke & Ell. and this identification was confirmed by Dr. J. W. Groves. Pathogenicity was established by inoculation.

Murakishi (H. H.). **Colour breaking of Vanda Orchids.**—*Bull. Pacif. Orchid Soc., Hawaii*, 9, 1, pp. 13–16, 3 figs., 1950.

A disease of *Vanda* orchids, variety Miss Joachim, characterized by distortion of the perianth, flower dwarfing, colour-breaking and chlorotic mottling, and distortion of the young leaf tips and shoots, was observed in Hawaii in February, 1950. The disease was transmitted successfully to healthy *Vanda* by sap inoculation (20 per cent. infection) and inarch grafting (89 per cent.). The minimum time for symptoms to appear in the flowers was 19 days, the maximum 48, and the average between 21 and 30; for the young shoot tips it was approximately 45 days after grafting. About 90 per cent. of the plants in the original planting were affected, spread having been increased probably by extensive propagation by cuttings. Miss Joachim var. Juliette and Prinses Beatrix are also susceptible. Attempts at insect transmission were unsuccessful, as were also sap inoculation and grafting to *Cattleya* [*R.A.M.*, 29, p. 309]. Further investigations on the identity of the virus are in progress.

Mezzetti (A.). **Il marciume del pedale della Calla prodotto dal Bacterium aroideae (Town.) Stapp in Italia.** [Basal rot of *Calla* caused by *Bacterium aroideae* (Town.) Stapp in Italy.]—*Ann. Sper. agr.*, N.S., 5, 1, pp. 207–220, 4 figs., 1951. [English summary.]

Calla lilies (*Zantedeschia aethiopica*) growing under glass in Genoa, Albano Laziale (Rome), Palestrina (Rome), and Montegiorgio were affected by basal rot (*Bacterium* [*Erwinia*] *aroideae*) [cf. *R.A.M.*, 25, p. 453; 29, pp. 252, 619]. In a preliminary test disinfection of the rhizomes and soil with formalin [cf. ibid., 9, p. 722] by immersing the former in a 2 per cent. solution for one hour and by sprinkling the latter ten days before planting with 20 l. per sq. m. of 1 per cent. solution, followed by a 'water seal' of 20 l. per sq. m., gave promising control.

Nicholls (Valerie O.). **Wilt disease of Dimorphotheca barberiae.**—*Trans. Brit. mycol. Soc.*, 34, 2, pp. 220–222, 3 figs., 1951.

In October, 1949, several *Dimorphotheca barberiae* plants in the Hiatt Baker Botanical Garden, University of Bristol, exhibited severe wilt symptoms. The roots were shrivelled and they disintegrated when touched, the stems were blackened from the base upwards, and all but the youngest leaves were chlorotic and flaccid. Isolations from surface-sterilized roots and stems yielded a *Fusarium* sp. identified in culture as a strain of *F. lateritium* [*Gibberella baccata*]. In pot inoculation experiments the disease was reproduced in cuttings of *D. barberiae* and the pathogen re-isolated from the roots and stems. In the summer of 1950 *D. barberiae* plants established in the bed from which the original wilted material was obtained showed

symptoms similar to those produced experimentally, indicating that the pathogen may survive in the soil from one year to the next.

A wilt disease caused by *Fusarium* sp. has recently been reported [from the United States] on *D. annua* (*Plant Dis. Reptr*, 32, p. 156, 1948).

Severin (H. H. P.) & Tompkins (C. M.). **Aphid transmission of a mosaic virus and symptoms of other virus diseases of Primula obconica.**—*Hilgardia*, 20, 15, pp. 279–298, 8 pl. (1 col.), 1950.

Primula obconica in commercial greenhouses in San Francisco is commonly affected by primula mosaic virus [*R.A.M.*, 21, p. 201]. *Myzus circumflexus*, which breeds on this host in the greenhouses, and *M. ornatus*, which multiplies in cages, are vectors. Aphids not multiplying on *P. obconica*, but found to be vectors, are *Aphis apii*, *A. ferruginea striata*, *A. gossypii*, *A. rumicis*, *Brevicoryne brassicae*, *M.* [*Macrosiphum*] *solani*, and *M. pisi*.

The symptoms of this virus on *P. obconica* cannot be distinguished from those of cucumber mosaic virus and of celery calico virus [ibid., 28, p. 265] on the same host. Western cucumber mosaic virus [loc. cit.] is distinct in that it causes large, irregular, dark green, blister-like elevations on the leaves and more severe colour-breaking in the petals. *P. obconica* is a symptomless carrier of tobacco mosaic virus, infection being local, not systemic, in the inoculated plants. When tomato spotted wilt virus [ibid., 26, p. 174] was transmitted to *P. obconica* by mechanical inoculation in the greenhouse the symptoms were marginal yellowing of inoculated leaves, followed by fusion of chlorotic areas with the appearance of scorching, and necrotic lesions; infected plants were stunted and the yellow leaves wilted, became dry, and the plants died; infection was systemic. California aster yellows virus [see below, p. 48] transmitted to *P. obconica* by *Macrosteles divisus* induced clearing of the veins and veinlets with yellow veinbanding on the youngest leaves, dwarfing of the newly developing leaves, and general yellowing of the older ones; virescence of the flowers was a striking symptom.

Kreitlow (K. W.) & Sprague (V. G.). **Effect of temperature on growth and pathogenicity of Sclerotinia trifoliorum.**—*Phytopathology*, 41, 8, pp. 752–757, 1 graph, 1951.

At the U.S. Regional Pasture Research Laboratory, State College, Pennsylvania, the optimum temperature for growth of 22 monoascospore isolates of *Sclerotinia trifoliorum* from Ladino clover [*R.A.M.*, 30, p. 521] ranged from 15° to 20° C., with the maximum and minimum at about 25° and 0° to 5°, respectively. Isolates grown at different temperatures were indistinguishable culturally. Both seedlings and older plants of Ladino clover contracted significantly heavier infection at 16° and 21° than at 27° and at 90 per cent. relative humidity than at 50. There were marked divergences in pathogenicity between the various monoascospore isolates from the same and from different apothecia.

Leach (J. G.) & Elliott (E. S.). **Black patch of Red Clover in West Virginia.**—*Plant Dis. Reptr*, 35, 7, pp. 335–336, 1951. [Multilithed.]

In recent studies at the West Virginia University, Morgantown, 'black patch' [*R.A.M.*, 22, p. 68], largely responsible for red clover failure in the South Branch Potomac Valley, has been shown to be due to a fungus, as yet unidentified. It is very destructive, affecting all parts of the plant, including the leaves, stems and flowers, death of the last causing great reduction in seed yield in fields that have excellent stands. The fungus infects the seeds and is seed-transmitted. It spreads from the infected seedling to adjacent plants by means of aerial mycelium. The disease, favoured by wet weather, appears to be very prevalent in the eastern part

of Virginia. Preliminary greenhouse experiments showed that seed treatment will decrease seedling infection and increase stands.

Allison (J. L.). **Rhizoctonia blight of forage legumes and grasses.**—*Plant Dis. Reptr*, 35, 8, pp. 372–373, 1951. [Multilithed.]

In North Carolina *Rhizoctonia* [*Corticium*] *solani* causes a destructive foliage blight on *Lotus uliginosus*, *L. corniculatus*, lucerne, and *Festuca arundinacea* [cf. *R.A.M.*, 30, p. 472]; *Lespedeza stipulacea*, *L. striata*, and soy-bean are less seriously affected [cf. ibid., 27, p. 187]; Ladino clover and *Dactylis glomerata* are resistant. The optimum temperature range for the growth of all isolates on potato dextrose agar was 25° to 30° C. In pathogenicity tests free moisture on the foliage was necessary for initial infection and subsequent development of the disease.

Anderson (C. W.). **The insect vector relationships of the Filaree red-leaf virus, with special reference to a latent-period difference between nymphs and adults in Macrosiphum geranicola (Lambers).**—*Phytopathology*, 41, 8, pp. 699–708, 1951.

In experiments at the Division of Entomology, University of California, Berkeley, *Macrosiphum geranicola* was shown to require a period of two to three hours for the acquisition of the red leaf virus from diseased white- and red-stem filaree (*Erodium moschatum* and *E. cicutarium*) plants [*R.A.M.*, 30, p. 471], but only 10 to 15 minutes to infect healthy ones. The virus became available to *M. geranicola* during the third day after the infection of a healthy filaree plant. Contrary to the experience of other workers with persistent viruses [ibid., 17, p. 497; 25, p. 245], protracted fasting of the aphids after acquisition did not impair their infectivity, nor did pre-feeding starvation result in their acquiring greater or more rapid infectivity.

The minimum period of latency of the red leaf virus in young nymphs of *M. geranicola* was found to be between 18 and 27 hours, while no adult succeeded in infecting a healthy plant within 48 hours of the time it was brought into contact with the inoculum. Discussing the cause of the latent period, the author suspects the implication of some factor, at present unknown, other than the reasons adduced by Watson [ibid., 19, p. 637; 25, p. 245]. *M. pelargonii*, *Aphis rumicis*, and *Rhopalosiphum prunifoliae* also transmitted the red leaf virus from diseased to healthy plants in these investigations.

Armstrong (Joanne K.) & Armstrong (G. M.). **Physiological races of the Crotalaria wilt Fusarium.**—*Phytopathology*, 41, 8, pp. 714–721, 1 fig., 1951.

This is an expanded account of the authors' studies on physiologic specialization in *Fusarium udum* var. *crotalariae*, the agent of *Crotalaria* wilt [*R.A.M.*, 29, p. 453] in the Louisiana–Mississippi area, Florida, and India, a preliminary note on which has already appeared [ibid., 30, p. 165]. The species used in the inoculation experiments were *C. juncea*, *C. spectabilis* [*C. sericea*], *C. verrucosa*, *C. incana*, *C. intermedia*, *C. mucronata* and its var. Giant Striata, *C. lanceolata*, and *C. usaramoensis*, of which the last-named remained immune from infection by any of the isolates, while all were pathogenic to the first three species. *C. lanceolata* served as a differential host for races 2 and 3 [loc. cit.], respectively, since it was very resistant to the former and highly susceptible to the latter, which attacked all species except *C. usaramoensis*. Race 1 was non-pathogenic to *C. intermedia*, *C. mucronata*, and *C. incana*, any of which, therefore, are also suitable for differential purposes.

Lobb (W. R.). **Resistant type of Rape for areas infected with club root.**—*N.Z.J. Agric.*, 82, 1, pp. 65–66, 2 figs., 1951.

In New Zealand, club root [*Plasmodiophora brassicae*] readily attacks rape of the

Broad Leaf Essex or Giant type [*R.A.M.*, 14, p. 278] in soils and areas where the disease is prevalent. After many years of research, seed of the Club Root Resistant variety is now being marketed, and its introduction is likely to make rape growing very important in some southern districts where losses from club root were a major cause of the decline in popularity of this crop. Club Root Resistant displayed high resistance in 38 plantings in Otago and Southland in 1947–8; 24 were free from disease, 8 showed a negligible trace, and 3 a measurable percentage. In the following two seasons good crops resulted even after an affected crop had been grown in the same land the year before. Where a whole crop of Broad Leaf Essex was infected and Giant very badly attacked, Resistant showed no effect.

Ciferri (R.). **Qualche dato recente circa le malattie da carenza nutrizionale degli alberi fruttiferi.** [Some recent data on nutrient deficiency diseases of fruit-trees.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, 8, 4, pp. 181–203, 1950.

The author discusses on broad lines various aspects of nutrient deficiency diseases of fruit-trees in Italy [cf. *R.A.M.*, 13, p. 384; 26, p. 18; 28, p. 579], the main points dealt with being their general geographical distribution in the country and the elements concerned, visual symptoms of the various deficiencies and those without apparent visual symptoms, those due to deficiency of several nutrients, techniques for field diagnosis, the inter-relation of mineral nutrients, soil, and other physiological factors, supra-optimal mineral fertilization, and the cure and prevention of these diseases.

Smith (H. C.). **Collar-rot of Apples and Gooseberries.**—*Orchard. N.Z.*, 23, 11, pp. 11, 13–14, 4 figs., 1950–1951.

Collar rot of apples and gooseberries, which has caused trouble for some years in various parts of New Zealand, has now been shown by inoculation to be due to *Phytophthora cactorum* [cf. *R.A.M.*, 2, p. 303; 29, p. 263, *et passim.*]. In one orchard at Huapai, near Auckland, the losses over five years amounted to about 5 per cent. of the total Cox's Orange planting and occurred mostly in low-lying areas. Several Merton 789 unworked [apple] stocks, one Delicious tree, and several gooseberry bushes were also affected. In Redwood's Valley, near Nelson, where several orchards were affected, the main losses were among Cox's Orange, while a few Delicious and Dunn's Favourite trees were also affected. Inoculation experiments demonstrated that Granny Smith apple trees are susceptible. Gooseberry bushes have been dying out with collar-rot symptoms at Huapai, Edgecumbe, Hamilton, Greytown, Nelson, and Dunedin for some years. In many established plantations at Greytown the losses average 5 per cent. every year. Isolates of what is believed to be the same fungus from hop roots [ibid., 30, p. 362] caused infection on apple trees. Improved drainage, careful cultivation, routine inspection for early infections which may be excised, treatment of wounds and cuts with Bordeaux paste, and maintenance of the routine Bordeaux sprays which appear to keep this disease in check are recommended control measures.

Harris (W. B.). **Black spot of Pears. Progress report—1949–51 seasons.**—*J. Dep. Agric. S. Aust.*, 54, 12, pp. 582–585, 3 figs., 1951.

Pear black spot [scab] (*Venturia pirina*) [cf. *R.A.M.*, 30, p. 168], not important in South Australia before 1947, has since caused losses and made a spray programme essential. Trials to determine the most efficient spray schedule were begun in 1948 on Williams Bon Chrétien pears, and in 1949–50 a comparison was made in two gardens at Inglewood of the standard pear scab schedule developed for Victoria [cf. ibid., 19, p. 104] and that designed for use locally in the drier hilly districts against apple black spot [scab: *V. inaequalis*: loc. cit.], viz. Bordeaux 6–4–40 at green tip, lime-sulphur 1 in 40 at white bud, 1 in 60 at petal fall, and 1 in 80 at

first cover (two weeks later). In this trial copper oxychloride was substituted for Bordeaux mixture. An outbreak of late scab occurred before picking and developed rapidly during harvest. In one locality the pear schedule gave 73·3 per cent. clean fruit, 16·8 per cent. early scab, and 9·9 per cent. late scab, while the corresponding figures for the apple schedule were 34·5, 8·7, and 56·8 per cent. At the second site the figures for the pear schedule were 63·2, 18·4, and 18·4 per cent., and for the apple 21·7, 13·9, and 64·4 per cent., respectively. These results indicate that the apple schedule is superior for the control of early scab and the pear one for the late. It seemed likely that the advantage of the former schedule was due to the use of lime-sulphur at pre-blossom and to the additional spray applied, while the benefit of the latter accrued from the use of copper, which is more persistent in the post-blossom stage. A further trial was made, therefore, in 1950–51 to compare the standard apple and pear schedules with two modified ones in which (*a*) two sprays of Bordeaux (6–4–40) were followed by two of lime-sulphur, and (*b*) Bordeaux (6–4–40) was followed by lime-sulphur (1 in 40) and then by Bordeaux (3–3–50). No late scab developed; at harvest the mean total scab in the four groups, respectively, was 17·2, 26·5, 25·9, and 20·2 per cent.

Until further trials have been made it is suggested that the apple schedule would be superior during a rainy spring and dry summer, while in wet summers the pear schedule would be better, on account of the greater control of late scab.

Two seasons' tests of ground spraying with dinoc (dinitro-*o*-cresol) to reduce ascospore discharge [ibid., 29, p. 625] indicated that the benefit obtained does not appear to warrant ground spraying under average pear-growing conditions.

Reid (W. D.). **Control of bacterial-spot of Plum.**—*N.Z.J. Sci. Tech.*, Sect. A, 31, 5, pp. 40–43, 1950 (issued March, 1951).

Further experiments on the control of bacterial spot of plums [*Xanthomonas pruni*] at Auckland, New Zealand [*R.A.M.*, 24, p. 375; 28, p. 378], during the seasons 1944 to 1948 inclusive, showed that of the various spraying treatments tested Bordeaux mixture was the most effective; control was improved by increasing its concentration and number of applications. In 1945–6 four applications of Bordeaux during the fruiting season reduced fruit infection from 38·9 to 6·8 per cent. on Doris trees and in 1946–7 from 19·6 to 5·5 on George Wilson. Satisfactory control without serious foliage damage was obtained when the first two applications were made at 2–4–100 and the second two at 3–6–100 [cf. loc. cit.].

Delitala (A.). **Seccume apicale dei rami di Pesco dovuto a Cytospora.** [Apical die-back of Peach branches due to *Cytospora*.]—*Ann. Sper. agr.*, N.S., 5, 2, pp. 433–440, 4 figs., 1 graph, 1951. [English summary.]

In the spring of 1950 a Hale peach tree near Ravenna, Italy, developed a rapid die-back of the tips of the young branches due to *Valsa leucostoma* [*R.A.M.*, 13, p. 39; 14, p. 450; 15, p. 447; 27, p. 569]. Affected twigs should be burnt; the usual fungicidal sprays may be applied preventively.

Cochran (G. W.), Wadley (B. N.), Kaloostian (G. H.), & Richards (B. L.). **Ring spot cause of tree degeneration in Utah orchards.**—*Fm Home Sci., Utah*, 11, 1, pp. 3, 20–21, 1950. [Abs. in *Biol. Abstr.*, 25, 8, p. 2285, 1951.]

In Utah peach, sweet and sour cherry, plum, apricot, and wild chokecherry [*Prunus demissa*] trees are all affected by the [necrotic] ring spot virus [*R.A.M.*, 30, pp. 572, 616]. Leaf symptoms usually appear only with the initial onset of the disease. On peach certain strains of the virus produce large bark-splitting cankers resembling winter-killing. Infected buds usually abort when grafted on virus-free rootstocks and vice versa. The virus may be transmitted through the seed to

seedling rootstocks. The insect vector is unknown. The planting of virus-free trees is the only control measure now recommended.

Wolfe (H. R.), Anthon (E. W.), Kaloostian (G. H.), & Jones (L. S.). **Leafhopper transmission of western X-disease.**—*J. econ. Ent.*, 44, 4, pp. 616–619, 1951.

This information on the transmission of western X-disease virus [? strain of peach X-virus: see next abstracts] by the leafhopper, *Colladonus geminatus*, in Washington, Oregon, and Utah has been noticed from another source [*R.A.M.*, 30, p. 476].

Anthon (E. W.) & Wolfe (H. R.). **Additional insect vectors of western X-disease.**—*Plant Dis. Reptr*, 35, 8, pp. 345–346, 1951. [Multilithed.]

In further experiments in 1949 and 1950 at Wenatchee, Washington, on the insect transmission of western X-disease virus [? strain of peach X-virus: see preceding and next abstracts], the disease was transmitted in the field from peach to peach varieties by the leafhoppers *Fiebierella florii*, *Keonolla confluens*, and *Scaphytopius acutus*, and in greenhouse tests by *F. florii* and *K. confluens* to Lovell peach seedlings. Under both field and greenhouse conditions *F. florii* also transmitted western X-disease to peach from sweet cherry affected with western X-little cherry [*R.A.M.*, 30, p. 170].

Kaloostian (G. H.). **Transmission of western X-disease virus from Chokecherry to Peach by Colladonus geminatus (Van D.).**—*Plant Dis. Reptr*, 35, 8, p. 347, 1951. [Multilithed.]

In January and February, 1951, at Logan, Utah, western X-disease [? strain of peach X-virus: see preceding and next abstracts] developed in two potted Lovell seedling peach trees after inoculation by *Colladonus geminatus* which had been fed on infected chokecherry (*Prunus demissa*). Retention of the virus by the insects for at least 47 days was indicated.

Kaloostian (G. H.). **Transmission of western X-little Cherry virus from sour and sweet Cherry to Peach by Colladonus geminatus (Van D.).**—*Plant Dis. Reptr*, 35, 8, p. 348, 1951. [Multilithed.]

In tests carried out at Logan, Utah, leafhoppers (*Colladonus geminatus*) produced western X-disease [? strain of peach X-virus: see preceding and next abstracts] in three potted Lovell peach seedlings after feeding on sour and sweet cherry trees infected with western X-little cherry virus [cf. *R.A.M.*, 30, p. 329]. The insects retained the virus for at least 72 days.

Kaloostian (G. H.), Nielson (M. W.), & Jones (L. S.). **Transmission of wilt and decline disease of Cherries in Utah by the black Cherry aphid.**—*Plant Dis. Reptr*, 35, 8, pp. 349–350, 1951. [Multilithed.]

Evidence of the transmission of the western X wilt and decline virus [? strain of peach X-disease virus: *R.A.M.*, 28, pp. 222, 464, and preceding abstracts] of cherries by the black cherry aphid *Myzus cerasi* was first obtained in Utah in 1949. Two of five test trees fed upon by aphids taken directly from infected cherry trees on [*Prunus*] *mahaleb* roots wilted and died. In 1950 a large-scale experiment was carried out in two field plots at Farmington and near Logan, Utah. Test Napoleon sweet cherry trees on *P. mahaleb* rootstocks were each bagged with about 50 apterous aphids from infected sweet cherry. Alternate trees were given aphids from presumably healthy trees or were left uninfested. At Farmington there was high mortality in the test trees and both types of control. At Logan nine of the 100 test trees wilted and died, but only one control, which had been exposed to

aphids from apparently healthy trees. These results indicate that a virus transmitted by the aphids had caused the wilting and death of most, if not all, of the nine trees, and that toxins introduced by the aphids were not responsible.

Bongini (Virginia). **Cancro del Cachi da Phomopsis diospyri n.sp.** [Persimmon canker caused by *Phomopsis diospyri* n.sp.]—*Ann. Sper. agr.*, N.S., 5, 2, pp. 273–281, 6 figs., 1951. [English summary.]

Further studies at the Phytopathological Laboratory, Turin, Italy, on canker of *Diospyros kaki* caused by *Phomopsis diospyri* [*R.A.M.*, 27, p. 482] confirmed the view that this fungus is the sole cause of the disease. The condition has also been reported from Novara, Manta, Crescentino, and near Turin. In addition to the measures previously recommended [loc. cit.], spraying with 3 per cent. ferrous sulphate gives control; all wounds and lesions in the collar and branches should be treated preventively with a fungicide.

Application of wax treatment to berry boxes (hallocks) to control molds.—*Circ. U.S. Bur. agric. industr. Chem.* AIC–270, 5 pp., 1 diag., 1950. [Mimeographed.]

This circular, superseding AIC–239 [*R.A.M.*, 29, p. 34] gives, in addition to the previous information, plans of and specifications for a semi-automatic dipping machine, with an explanation of its mode of operation. The machine applies a uniform coating of wax in accordance with the procedure previously described. It handles 720 boxes $5\frac{1}{2}$ in. square by $2\frac{1}{2}$ in. deep per hour.

Hickman (C. J.) & English (Mary P.). **Factors influencing the development of red core in Strawberries.**—*Trans. Brit. mycol. Soc.*, 34, 2, pp. 223–236, 1 diag., 1951.

The influence of soil moisture and soil pH on the development of red core of strawberries (*Phytophthora fragariae*) [*R.A.M.*, 28, p. 528] was studied in the Department of Botany, University of Birmingham, by means of standardized pot-infection techniques using the susceptible variety Huxley and a single isolate of the fungus from diseased Cornish plants or infected root pieces 1 in. long. The degree of infection was expressed as a percentage of the total root length discoloured by the fungus. Maximum infection occurred under conditions of high soil moisture, which promoted zoospore liberation. This may be achieved either by frequent water applications to a freely draining soil or by waterlogging from below. The same conditions would arise on freely drained soils in areas of high rainfall or where there was impeded drainage. Transport of zoospores by soil water movement is of great importance in promoting infection, particularly when the inoculum is remote from the roots. In general the lighter the soil texture the greater was the amount of infection. In Birmingham soils adjusted to a range of pH values subsequent infection tended to decrease with a rise in pH towards alkalinity. In similar experiments with field soils from Worcestershire, Wisbech, King's Lynn, and Cheddar little infection occurred in most of the alkaline soils tested, but in some the disease was severe.

The results are discussed in relation to the occurrence of red core in the field in various parts of Britain.

Baker (R. E.) & Butterfield (H. M.). **Commercial bush berry growing in California.**—*Circ. Calif. agric. Ext. Serv.* 169, 50 [+5] pp., 30 figs., 1 diag., 1951.

In the section of this publication dealing with diseases of bush fruits in California (pp. 35–40) it is stated that trailing varieties of blackberry throughout the State are commonly affected by a cane die-back, which prevents the buds from breaking or retards their development, apparently associated with water deficiency, as the only almost unaffected plantings are on well-irrigated land. No stage below normal

produces satisfactory fruit, many of which become mummified when small. Leaf scorch without any definite pattern is present. Nearly all the leaves are small and have a mottled appearance.

Fruit mould of [blackberries and] loganberries caused by *Botrytis cinerea* [cf. *R.A.M.*, 19, p. 24] can usually be avoided by adequate spacing of the canes on the trellises, so that the berries dry off quickly after wetting.

Armillaria mellea destroys blackberry bushes [cf. ibid., 3, p. 259] in some areas. All diseased plants and at least one healthy plant on either side should be removed together with all affected roots to a depth of two to three feet. A system of disinfecting the soil with carbon disulphide has been devised [cf. ibid., 30, p. 403].

Orange rust [*Gymnoconia interstitialis*: cf. ibid., 3, pp. 280, 300; 6, p. 567; 15, p. 237; 30, p. 573] is troublesome in the coastal berry-growing districts, where the wild Pacific Coast blackberry is severely attacked. Crandall and Young are badly affected, loganberry less seriously, and Himalaya blackberry only slightly. Boysen appears to remain unaffected, even when Young plantings in the immediate vicinity are badly diseased. Growers should co-operate in removing and destroying affected plants.

Currants and gooseberries are often affected by *Sphaerotheca mors-uvae* [cf. ibid., 29, pp. 34, 418; 30, p. 478], and raspberries may be severely attacked by *S. humuli* [cf. ibid., 14, p. 181; 30, p. 15]. Infected shoots should be cut off and burnt during the pruning season, and all leaves raked and burnt. Currants and gooseberries may be sprayed with lime-sulphur; further investigation is needed to find a safe and effective spray for raspberries.

Wilcox (R. B.). **Tests of Cranberry varieties and seedlings for resistance to the leafhopper vector of false blossom disease.**—*Phytopathology*, 41, 8, pp. 722–735, 1 fig., 1951.

At the Plant Industry Station, Beltsville, Maryland, 13 named cranberry varieties and 494 seedlings of known parentage were used in selective tests in which the leafhopper vector (*Scleroracus vaccinii*) of the false blossom virus [*R.A.M.*, 10, p. 739; 25, p. 126] was given a choice of feeding plants; by this means it was possible to estimate the relative palatability of the material and its consequent tendency to contract the disease [ibid., 13, p. 249].

The results indicated that in hybridization varieties of known susceptibility to vector attack tend to contribute their respective reactions to the progeny. Both susceptibility and resistance appear to be the outcome of numerous factors rather than of unit dominance. In these experiments one named variety (Shaw's Success) and several hybrid seedlings proved more resistant to infestation by *S. vaccinii* than McFarlin, which is characterized by considerable resistance in plantings. No variety was entirely immune from leafhopper feeding. Evaluating the selective feeding test as an indicator of resistance to vector attack, it was concluded that the palatability of a given variety as a source of food depends on the capacity of the insect to survive and multiply from year to year. The rating test, therefore, is an indirect measure of the probable degree of survival and reproduction rate of *S. vaccinii*. From the available evidence it appears quite feasible to originate cranberry varieties from the parental material now on hand which will be appreciably more resistant to infestation by the vector of false blossom virus than any at present under cultivation.

Wynd (F. L.) & Bowden (R. A.). **Response of chlorotic Blueberry bushes to a very insoluble iron-containing glass frit.**—*Lloydia*, 14, 1, pp. 55–57, 1 col. pl., 1951.

A very insoluble, finely powdered, glassy frit, containing 5 per cent. ferric oxide [*R.A.M.*, 30, p. 261], mixed with the upper 12 inches of soil beneath blueberry

bushes [*Vaccinium* spp.] exhibiting symptoms of extreme iron deficiency at the University of Georgia, Athens, resulted in the restoration of the normal green colour after 194 days and in complete recovery after 445.

Hartmann (H. T.) & Papaioannou (P.). **Olive varieties in California.**—*Bull. Calif. agric. Exp. Sta.* 720, 55 pp., 29 figs., 1 map, 1951.

Among the chief olive varieties grown in California Sevillano is susceptible (apparently because of physiological weaknesses) to three rather obscure diseases, 'soft nose', 'split pit', and 'shotberry' or 'shorts'. Soft nose causes the fruit to darken at the apex and to shrivel. In 'split pit' the normally broad, conical apex is flat and blunt and the stone is split into two. The seeds of trees affected by 'shotberry' are aborted. The Barouni variety is more susceptible to olive knot (*Bacterium* [*Pseudomonas*] *savastanoi*) [*R.A.M.*, 14, p. 643; 18, p. 330] but more resistant to peacock spot (*Cycloconium oleaginum*) [ibid., 28, p. 465] than Mission.

Bazán de Segura (C[onsuelo]). **Carica papaya, another possible host of Phytophthora cinnamomi.**—*Plant Dis. Reptr*, 35, 7, p. 335, 1951. [Multilithed.]

Phytophthora cinnamomi, which has caused so much damage to avocado trees in the Chanchamayo Valley, Peru [*R.A.M.*, 27, pp. 255, 327], is thought to attack also papaw plants [cf. ibid., 27, p. 483], which were observed dying recently in the same locality. The drying and progressive fall of the papaw leaves results finally in complete defoliation and death. The fungus was isolated from a high percentage of the roots of the diseased plants at La Molina Experiment Station.

Bertossi (F.) & Ciferri (R.). **Formule per la correzione della percentuale di mortalità nelle spore.** [Formulae for the correction of the percentage mortality of spores.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, 8, 4, pp. 145–153, 1950. [English summary.]

In estimating the fungicidal efficacy of a product by the slide germination test [cf. *R.A.M.*, 25, p. 222; 27, p. 435; 28, p. 132] account has not hitherto been taken of the length of the germ-tubes emitted by surviving spores though, other factors being constant, this is certainly affected by the nature and action of the fungicide. For example, each of two compounds may permit 50 per cent. spore germination, but one may allow only scanty and the other abundant development of the germ-tubes.

The authors give new formulae for the correction of estimates of spore germination, based on the relative lengths of the germ-tubes. An arbitrary value of 1 is assigned to short tubes and 3 to long ones. It is assumed that for the number of surviving spores (s) there is a normal length of germ-tube $l(s)$; this should be at a maximum (= 3) when s is a maximum. A mortality m is not corrected if the average germ-tube length l_m is equal to $l(s)$. On the other hand, when there is scanty development of the germ-tubes the general formula used for corrected spore mortality M is $1 - \frac{l_m}{3}\sqrt{s}$ and that for corrected survival S is $\sqrt[n]{s}\left(\frac{l_m}{3s}\right)$ where n is a positive integer whose value is decided by the degree of importance it is desired to attach to the length of the germ-tube.

Hartsuijker (K.). **Chloor-nitrobenzeen-verbindingen als fungiciden.** [Chloronitrobenzene compounds as fungicides.] –*Meded. LandbHoogesch. Wageningen*, 15, 1, pp. 219–226, 1950. [English summary.]

Reports of the British Intelligence Objectives Subcommittee have disclosed the composition of four classes of chloronitrobenzene compounds applicable as

fungicides [see next abstract], namely, pentachloronitrobenzene, represented by brassicol [*R.A.M.*, 30, pp. 31, 402], aafuma, Boots' *Botrytis* dust, botrilex (all at 20 per cent.), and tritisan [ibid., 30, p. 28] at 15 per cent.; tetrachloronitrobenzene [ibid., 30, p. 385], comprising folosan DB905 [ibid., 28, p. 109] and fusarex [ibid., 29, p. 328] at 5 and 3 per cent. respectively; trichlorodinitrobenzene (brassisan) at 20 per cent. [ibid., 28, p. 554]; and trichlorotrinitrobenzene (bulbosan) at 7·5 per cent. [ibid., 29, p. 63].

Malt agar cultures of *Botrytis cinerea*, *B. tuliparum*, *Sclerotinia sclerotiorum*, and (in one series of tests) *Rhizoctonia* [*Corticium*] *solani* were used in assays of the toxicity of these compounds. The two *B.* spp. succumbed readily to pentachloronitrobenzene and tetrachloronitrobenzene, *S. sclerotiorum* was more resistant, and *C. solani* unaffected. Both these compounds were fungistatic rather than fungicidal. Tetrachloronitrobenzene exerted a stronger action on *B. cinerea* than pentachloronitrobenzene at an equivalent concentration; brassisan was about on a par with the latter.

Mention is also made of two related compounds, i.e., hexachlorobenzene, specific against wheat bunt [*Tilletia caries* and *T. foetida*: ibid., 29, p. 148], and thiocyanodinitrobenzene, a constituent of the copper oxide-containing Bayer 2317W, which is effective against zoospore-forming fungi, such as *Plasmopara* [ibid., 26, p. 285] and *Phytophthora*.

Hartsuijker (K.). **Fungicides in de landbouw.** [Fungicides in agriculture.]—*Maandbl. LandbVoorl.*, 8, 8, pp. 320–329, 1951.

In this address to Dutch advisers in plant pathology on the use of fungicides in agriculture, reference is made to copper, sulphur, mercury, and thiuram preparations, carbamates, chloronitrobenzene compounds [see preceding abstract], quinones, and TP. 13, and their specific applications. The active principle of the last-named, a product of Standard Oil, is trichloro-methyl-thiotetraphthalimide [cf. *R.A.M.*, 30, p. 635], and it has been provisionally authorized in Holland for the control of potato blight [*Phytophthora infestans*] at a dosage of 0·4 to 0·6 per cent. Its performance approximates to that of the carbamates, the initial promise of which requires further substantiation under different sets of conditions.

Summary tables of biological tests sponsored by the Chemical-Biological Coordination Center.—Published by the National Research Council, Washington 25, D.C., 3, 1, pp. [6+] 1–62; 2, pp. [7+] 63–136, 1951. [Mimeographed.]

In the first of these publications [cf. *R.A.M.*, 30, p. 175] 4-chloro-2-(2,3-dichloropropyl) phenoxyacetic acid and bis (dimethylthiocarbamyl) sulphide are listed as active against *X*[*anthomonas*] *phaseoli* [loc. cit.] at 0·07 mgm. per ml. The following at 250 p.p.m. gave 100 per cent. inhibition of growth of *Aspergillus niger* spores [ibid., 30, pp. 577, 623]: *p* chloro, 2-chloroethyl ester of benzenesulphonic acid; 3-anilinomethyl-2(3H)-benzothiazolethione; 6,6′ diallyl-α,α′-bis (diethylamino)-dihydrochloride of 4,4′ bi-*o*-cresol; 2,3′,4,5′, 6-biphenylpentol dihydrate; 2-nitro-*p*-cresol (also at 80 p.p.m.); 4-(2-methylallyloxy)-diphenylamine; α-acetyl-ethyl ester of hydrocinnamic acid; ethynylenebis [2-methoxyethyl-] mercury; phenyl mercury butyrate; phenyl mercury propionate; 2,4-dinitro-1-naphthol; α (diamylaminomethyl)- 1,2,3,4-tetrahydro-, 9-phenanthrenemethanol hydrochloride; methyl phloroglucinol; 3,5-dimethyl-4-nitroso-1-(*p*-tolyl)-pyrazole; dioxime *p*-quinone; and 6,7-quinoxalinediol monohydrochloride: *o*-nitro-phenol (1×10^{-3}moles per l.) gave 100 per cent. inhibition of growth of *A. niger*, *Penicillium citrinum*, and *Trichoderma*.

In No. 2 (p. 77) a correction is made of an item on p. 13 of Vol. I, No. 1 [ibid., 29, p. 630] to read: '*p*-hydroxy-butyl ester of benzoic acid was effective against

Stemphylium sarciniforme and *Sclerotinia fructicola* at a minimum dose of 100 p.p.m.'

Against the former 1,2-decanediol and β-oxo-diethyl ester (cupric derivative) of glutaric acid were effective at 10 p.p.m. and against the latter at 100 p.p.m., while meso-inositol was effective against the former at 10 p.p.m., and against the latter at 1,000 p.p.m. All the 49 chemicals tested against *Diplodia natalensis*, *Phomopsis* [*Diaporthe*] *citri*, and *Penicillium* spp., by dipping citrus fruits in the test solutions, were ineffective or severely injurious.

Octylmercapto-acetic acid and α-phenyl-acetoacetonitrile were effective against *X. phaseoli* at 0·07 mg. per ml.; 9,9-chloro-9,10-diphenyl acridan hydrochloride at 0·25 mg.; γ-bromo-γ-nitro-β-phenyl butyrophenone (0·15); dimethyl-dithio-, 2,4-dinitrophenol ester of carbamic acid (0·06); bis (dimethylthiocarbamyl) disulphide (0·1); dodecyl-, hydrobromide of guanidine (0·11); 1-dodecyl-1-methyl-piperidinium iodide (0·13); β-octyl-mercapto propionic acid (0·06); and 6 GDN rhodamine (0·14).

Schmitt (C. G.). **Comparison of a series of derivatives of 4, 5-dimethyl-2-mercapto-thiazole for fungicidal efficacy.**—*Contr. Boyce Thompson Inst.*, 16, 6, pp. 261–265, 1951.

Of 20 derivatives of 4,5-dimethyl-2-mercaptothiazole [cf. *R.A.M.*, 28, p. 75] tested at the Boyce Thompson Institute, New York, the most fungitoxic (at 200 to 400 p.p.m.) to *Fusarium* [*bulbigenum* var.] *lycopersici*, *Sclerotinia fructicola*, *Polyporus tulipiferus*, *Phytophthora cinnamomi*, and *Trichophyton rosaceum* [*T. roseum*: ibid., 30, p. 622] in agar plate tests were the benzoyl, *n*-butyl, and acetonyl derivatives. In soil burial tests strips of cotton duck in moist humus were better protected by the lead salt. The zinc and magnesium salts were next in order, and all three were superior to the non-metallic derivatives and to the copper salt.

MacDonald (J. A.). **Introduction to mycology.**—x+177 pp., 163 figs., London, Butterworths Scientific Publications, Ltd., 1951. 15*s*.

This account of the fungi is essentially an introduction and is rigorously restricted to descriptions of the major phenomena in general terms with reference to a limited number of examples. After an introductory and a general chapter and a brief note on classification the main groups are treated in turn.

Plant pathological investigation in the United States. III.—*Plant Dis. Reptr, Suppl.* 200, pp. 21–55, 1 fig., 1951. [Multilithed.]

This contribution to the present series [cf. *R.A.M.*, 30, p. 143] comprises papers by J. A. Stevenson (pp. 21–29) on 'The activities of the mycological collections of the United States Department of Agriculture with a phytopathological slant, 1885 to 1950', with a bibliography of 125 titles; by P. A. Young and G. M. Watkins (pp. 30–35) on 'History of plant disease research in Texas'; by S. A. Wingard (pp. 36–41) on 'The role of plant pathology in Virginia agriculture'; and by G. W. Fischer (pp. 42–55) on 'Plant pathology in the State of Washington, past, present, and future'.

Buchholtz (W. F.) & Wallin (J. R.). **Plant pathological investigation in the United States IV. Plant disease research and extension in Iowa.**—*Plant Dis. Reptr, Suppl.* 203, pp. 95–107, 1951. [Multilithed.]

In this fourth contribution to this series [see preceding abstract] the authors briefly review and discuss some of the more important aspects of plant disease research work in Iowa during the last thirty years or more. A bibliography of 122 titles is appended.

Polunin (N.). **Arctic aerobiology: pollen grains and other spores observed on sticky slides exposed in 1947.**—*Nature, Lond.*, 168, 4278, pp. 718–721, 2 maps, 1951.

In this further paper [cf. *R.A.M.*, 30, p. 56] it is stated that during 1947 survey flights over North-West Territories, Canada, were made (1) on 12th August from north-west of Great Bear Lake northward to Langton Bay on the Arctic Ocean coast, and thence north-westward to the mouth of the Horton River, near Cape Bathurst; (2) on 26th from Cambridge Bay, Victoria Island, north-eastward to the southern extremity of Somerset Island; (3) on 27th from Cambridge Bay south-westward to Yellowknife; (4) on 5th September almost due south from Yellowknife to Edmonton, Alberta. The altitude was mostly one mile and the air-speed about 115 m.p.h. An attempt was made to expose a fresh vaselined slide and nutrient plate every twenty air miles on the first two flights and every thirty on the last two, and apart from some unavoidable gaps it was possible to obtain an almost unbroken transect extending over some 1,500 miles from the vicinity of the North Magnetic Pole to Edmonton.

On flight (1) the total number of spores of *Puccinia graminis* identified on 11 slides exposed was 2, *P. triticina* 1, *Alternaria* spp. 4, *Helminthosporium sativum* 4, and smut (not a cereal smut) 1. On flight (2) the corresponding figures (15 slides) were 0, 0, 2, 1, and 0; on the third (12 slides) 0, 4, 3, 1, and 0; and on the fourth (14 slides) 73, 289, and 12 for the first three fungi, *Helminthosporium* spp. 15, and smut [*Ustilago* spp. and *Tilletia* spp.: loc. cit.] 174. Spores were found far north of their probable nearest point of origin; uredospores of *P. graminis* up to latitude 70° 02′, nearly 1,000 miles north of the Peace River area, the nearest likely source of supply.

Becquerel (P.). **La suspension de la vie des spores des bactéries et des moisissures desséchées à la vide, vers le zéro absolu. Ses conséquences pour la dissémination et la conservation de la vie dans l'univers.** [The suspension of the life of bacterial and mould spores dried *in vacuo* near absolute zero.]—*C.R. Acad. Sci., Paris*, 231, 25, pp. 1392–1394, 1950.

Spores of *Bacillus subtilis*, *B. mesentericus*, *Aspergillus niger*, *Penicillium 'glaucum'*, *Mucor mucedo*, and *Rhizopus niger* [*R. (?) nigricans* = *R. stolonifer*] attached to dehydrated seeds [of lucerne, clover, tobacco, and *Petunia*], experiments with which were described in an earlier paper [*C.R. Acad. Sci., Paris*, 231, pp. 1274–1277, 1950], were enveloped in compressed iron alum powder and maintained for two hours in a vacuum at 0·0075° to 0·047° K. Transferred to bouillon and to pieces of alkalinized and sterilized potato in test tubes, the spores germinated in a few days at 25° C.

Pesante (A.). **Sopra un caso di danneggiamento della vegetazione dovuto a sostanze catramose.** [On a case of injury to plant growth due to tarry substances.]—*Ann. Sper. agr.*, N.S., 5, 1, pp. 179–200, 12 figs., 1951. [English summary.]

Numerous species of plants growing in the vicinity of an industrial plant in Italy developed injury due to the coal tar fumes emitted [cf. *R.A.M.*, 30, p. 207]. Vines were very severely affected, the chief symptoms being a characteristic glint, starting on the young leaves which gradually became bronze or red-brown-violaceous, marked upward curling, and sometimes chlorosis of the young leaves with rapid necrosis of large areas, occasionally accompanied by laceration and distortion. The grapes were similarly affected. After some years' exposure development of the vines was considerably reduced. Varieties severely affected were Barbera, Freisa, and Bonarda; Neretto and Plassa were less susceptible, and *Vitis labrusca* was highly resistant. Similar symptoms were displayed by walnut,

persimmon, apple, pear, plum, cherry, fig, rose and other ornamentals, and some trees. Peach trees were very resistant.

Anderson (A. A.) & Michener (H. D.). **Preservation of foods with antibiotics. I. The complementary action of subtilin and mild heat.**—*Food Tech.*, 4, 5, pp. 188–189, 1950.

Studies at the Western Regional Research Laboratory, Albany 6, California, indicated that in the presence of very small amounts of subtilin [cf. *R.A.M.*, 26, p. 447; 28, p. 533] foods can be preserved with only very mild heat treatment (212° F. or below, for a few minutes). Shelled peas in cans were inoculated with *B*[*acillus*] *stearothermophilus*. Two per cent. sodium chloride brine containing subtilin at 0, 5, 10, or 20 p.p.m., based on total contents, was added under vacuum to fill the cans, which were then given five or ten minutes' heat treatment and incubated at 77° or 122° for at least one week. All untreated tins were badly spoiled and the two cans receiving 5 p.p.m. of subtilin and five minutes' heat were slightly spoiled. All the remaining cans were normal. Similar experiments with asparagus and maize gave similar results. The evidence so far obtained suggests that subtilin as a food preservative would be harmless. Further work is to be described later.

Darpoux (H.). **Les antagonismes microbiens et les substances antibiotiques en pathologie végétale.** [Microbial antagonism and antibiotic substances in plant pathology.]—*Mém. Soc. bot. Fr., 1950–1951*, pp. 140–144, 1951.

The author briefly reviews, from the literature, the present knowledge of antagonism between fungi or between substances secreted by them [*R.A.M.*, 30, pp. 184, 335], with particular reference to the soil and to the control of fungus and virus diseases [ibid., 30, p. 83].

Ruggieri (S.). **Fungicidal varnishes and lacquers.**—*Paint Varn. Prod.* (formerly *Paint Varn. Prod. Mgr*), 30, 12, pp. 8–10, 30, 4 figs., 1950.

Some useful information is presented on the protection of electrical equipment from fungal damage [*R.A.M.*, 25, p. 466; 29, p. 525]. Of the metallic fungicides the most effective are the phenyl mercuric salts [ibid., 30, p. 623], while salicylanilide and pentachlorophenate are the best of the non-metallic. The last-named, however, is toxic, corrosive, and uneconomical, and the use of the salicylanilide is therefore laid down in the Bureau of Ordnance (United States) specifications for fungicidal coating materials.

In tests on a mixture of *Aspergillus niger* [see above, p. 26], *A. flavus*, *Penicillium luteum*, and *Trichoderma* T-1 [loc. cit.], a combination of 1 per cent. phenyl mercuric *o*-benzoic sulphamide and 5 per cent. salicylanilide proved to be effective, and in the above-mentioned specifications it is recommended, under the designation of 'Class MS', for general use except for unprotected selenium rectifiers. In such cases 'Class S' (8 per cent. salicylanilide) should be substituted except where temperatures above 185° F. prevail. Under conditions precluding the use of either of these classes, copper-8-quinolinolate is likely to afford the necessary protection, and extensive tests are planned to establish its value for this purpose.

Resistance to micro-organisms in cordage. Indian standard procedures.—*Cordage World*, 32, 374, pp. 13–16, 1950.

Full particulars are given of the standard procedures used in India for the assessment of resistance of cotton textile materials, comprising plain and waterproofed fabrics, webbing, yarns, and cordages (other than jute), to microbiological infection [*R.A.M.*, 29, p. 272]. The methods are also applicable to the evaluation of compounds and treatment processes designed for the protection of such materials

from damage by micro-organisms, including *Aspergillus niger* (Kanpur culture No. 51), *A. fumigatus* (No. 3), *Chaetomium globosum* (No. 6), *Rhizopus nigricans* [*R. stolonifer*] (No. 39), *Memnoniella echinata* (No. 119), *Acrothecium* sp. (No. 27), *Torula* sp. (No. 145), *Metarrhizium glutinosum* (No. 159), and *Curvularia* sp. (No. 362) [ibid., 30, p. 529].

Démétriadès (S. D.). **Sur une substance toxique pour les plantes, sécrétée par Sclerotinia sclerotiorum (Lib.) Massee.** [A substance toxic to plants secreted by *Sclerotinia sclerotiorum* (Lib.) Massee.]—*Ann. Inst. phytopath. Benaki*, 4, 1–2, pp. 27–33, 6 figs., 1950.

Experiments in Greece demonstrated that *Sclerotinia sclerotiorum* grown in Richards's solution secretes a thermostable, non-volatile substance toxic to potato, tomato, chilli, fig, vegetable marrow, and vine. It caused rapid, irreversible wilting and, in the case of fig, leaf rolling. Toxicity was considerably diminished at dilutions of 1:5 and 1:10. The substance was precipitated by ethyl alcohol, but the precipitate, after solution in distilled water, was less toxic than the untreated filtrate.

Yusef (H. M.). **An investigation of the requirements of some Hymenomycetes for specific essential metabolites.**—Dissertation (Publication 1727), Columbia University, 168 pp., 1950. [Abs. in *Biol. Abstr.*, 25, 5, pp. 1385–1386, 1951.]

At Columbia University, New York, 41 species or strains of *Fomes* and *Polyporus* [*R.A.M.*, 30, pp. 65, 117], which grew less vigorously on a basal medium of mineral salts, asparagine, dextrose, and purified agar than on 2 per cent. malt extract agar, were found to be heterotrophic for thiamine and were classified into six groups according to the degree of deficiency. Even when vitamins and casein hydrolysate were added to the basal medium more than half the strains grew substantially better on the malt medium, which was not equalled for certain fungi by any synthetic one. Unidentified growth factors appeared to be present in the malt, possibly of two types, one adsorbed on charcoal and active for some fungi and the other not adsorbed on charcoal and effective for others.

Zachos (D. G.). **Notes phytopathologiques I. Un cas d'attaque de mildiou de la Pomme de terre en rapport avec les facteurs météorologiques de l'année 1949.** [Phytopathological notes I. A case of attack of Potato mildew in relation to meteorological factors during the year 1949.]—*Ann. Inst. phytopath. Benaki*, 4, 1–2, pp. 17–18, 1950.

In November, 1949, a severe epidemic of potato blight (*Phytophthora infestans*) [C.M.I. map No. 109; *R.A.M.*, 5, p. 15] occurred near Chalcis, on Euboea island, Greece, causing losses amounting to 30 to 40 per cent. of the harvest. A study of the meteorological conditions over the period 1st to 20th November, when the disease became severe, showed that the factors considered necessary for its development in Holland [ibid., 30, p. 537] prevailed on 2nd, 3rd, 9th, and 12th, except for dewfall which was replaced by rain. Rainfall on the 6th, 8th, and 11th also contributed to disease extension. Losses from *P. infestans* occurred in other parts of Greece during 1949.

Campbell (J. C.) & Pepper (B. B.). **Some observations on effects of wettable DDT and emulsifiable DDT on Potato quality and blight control.**—*Amer. Potato J.*, 28, 6, pp. 638–640, 1951.

In an experiment carried out in New Jersey in 1950 to determine the effect of DDT solvents on tuber flavour of Katahdin potatoes late blight [*Phytophthora infestans*] developed on approximately 75 per cent. of the leaves of plants sprayed with DDT emulsions prepared with five different solvents, though adjacent plants

sprayed with wettable DDT powder showed under 5 per cent. infected leaves. Other plots sprayed with basic copper+wettable DDT throughout the season had under 1 per cent. blight.

Boyd (A. E. W.). **The internal blackening of Potatoes caused by bruising.**—*J. hort. Sci.*, 26, 2, pp. 148–156, 2 pl., 1951.

Studies at the Plant Pathology Laboratory, Department of Agriculture for Scotland, Edinburgh, on the internal blackening of potatoes caused by bruising [*R.A.M.*, 27, p. 153; 30, p. 429] showed that the tubers must be in a relatively flaccid condition before appreciable blackening can occur. Thus factors which favour loss of turgidity increase susceptibility. The incidence of blackening, the rate of development, and severity progress as the storage season advances, and may reach a point where intense blackening of almost the whole tuber may develop within 24 hours of bruising. Susceptibility is greatest at the stalk end and least at the rose, and in large tubers rather than small ones. The degree of bruising affects the development of blackening and one of the commonest causes is probably the combined process of desprouting and riddling late in the storage season. Balanced manuring reduces blackening. The relative humidity of the storage atmosphere should not be too low and sprouting should be retarded as much as possible.

Baldacci (E.), Ciferri (R.), & Fabris (A.). **Ricerche ed esperienze sulle malattie del Riso. VII. La concimazione azotata in relazione alla patologia del Riso e alla sindrome indicata come 'lussuria'.** [Researches and experiments on the diseases of Rice. VII. Nitrogenous fertilizer in relation to the pathology of Rice and to the syndrome known as 'lussuria'.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, 8, 5, pp. 243–269, 1951. [English summary.]

In further work on rice diseases in Italy [*R.A.M.*, 28, p. 239] experiments were performed in an attempt to determine the etiology of a condition known as 'lussuria' or 'luxury' disease and hitherto commonly attributed to excessive nitrogen. Affected plants are taller and more erect than normal, the leaves are a vivid green, and the sheaths adhere tightly to the stem. The inflorescence remains erect. The spikelets have greenish or yellow-green buds, and after the fall of the anthers sometimes show extensive brown or reddish-brown spotting, especially when they remain sterile. The ovary is fertilized but aborts. Affected plants are attacked secondarily by fungi. In experiments at Novara in 1949 and at the Plant Pathological Institute, University of Milan, and the Botanical Institute, Pavia, in 1950 rice plants were grown in concrete boxes in the field, being supplied with various nitrogenous fertilizers containing up to 14 times the maximum dosage of nitrogen used under field conditions. In no instance were the symptoms of the disease reproduced. Negative results were also obtained in 1950 at Novara and Pavia following irrigation with water used in the manufacture of synthetic nitrogenous fertilizers and with aqueous and acetone extracts of stable manure and cultivated soil.

Cheremisinov (N. A.). Мучнистая роса кок-сагыза. [Mildew of Kok-Saghyz.]—Бот. журн. [*J. Bot. U.S.S.R.*], 36, 1, pp. 72–77, 2 figs., 1951.

The author considers that the form of powdery mildew (*Sphaerotheca fuliginea*) on *Taraxacum kok-saghyz* is a new form, *S.f.*f. *kok-saghyz*. It differs from the species in its morphology. It is nearest to f. *taraxacum* [*R.A.M.*, 18, p. 615], although its cleistocarps are twice as large, 72·8 to 91 μ in diameter, and the outer cells of the peridium half the size, 14·4 to 18 by 10·8 to 14·4 μ. There is little difference in the ascospores, which are almost globular and 14·4 to 18 μ in diameter. The asci measure 47·6 to 64·8 by 46 to 57·6 μ and are ellipsoidal or globular. Appendages

are few, simple, angular, 106 to 178 μ long, pale brown at the base and hyaline at the tip. The unicellular, hyaline conidia are 28·8 to 30·6 by 14·4 to 16·2 μ.

There is little information about the powdery mildew of kok-saghyz, its origin, spread, and the damage it induces. It was first reported from Ukraine and the Caucasus as not very harmful to the plant, but has since (in 1948) been found to cause a great deal of damage in plantations in the Kursk district.

Nicholas (D. J. D.) & Fielding (A. H.). **The use of Aspergillus niger (M) for the determination of magnesium, zinc, copper and molybdenum available in soils to crop plants.**—*J. hort. Sci.*, 26, 2, pp. 125–147, 10 pl., 1951.

In studies at Long Ashton Research Station, Bristol, *Aspergillus niger* (Mulder's strain) [cf. *R.A.M.*, 25, p. 105] was used as a test organism to determine trace elements in test materials [cf. ibid., 29, p. 171]. The sensitivity of the bioassay method is indicated by the following effective nutrient ranges [loc. cit.] in μg per 50 ml. of culture solution: magnesium 25 to 500; iron 0·1 to 20; manganese 0·01 to 10; and molybdenum 0·00005 to 0·02. Estimates of dry weight and sporulation do not always give parallel results, as it is possible to get complete sporulation without having attained maximum dry weight, and vice versa. For assays of zinc and molybdenum dry weights are important while for copper spore colour is a better index of nutrient level.

The pH value of the culture solution exercised an important effect on the availability of nutrients. For molybdenum it must be adjusted to pH2 to obtain the maximum difference between normal and deficient soils.

Using the bioassay method for soils the following were confirmed: copper and zinc deficiency in a sandy soil and molybdenum deficiency in soils where *Brassicae* showed whiptail symptoms [cf. above, p. 2]. In some cases the amounts of mineral micronutrients determined by bioassay are below the limit of chemical detection.

Yarwood (C. E.). **Hop cankers.**—*Plant Dis. Reptr*, 35, 8, pp. 361–363, 1 fig., 1951. [Multilithed.]

On several occasions since 1935 the author has observed hop cankers in California. The most important type usually extended about 3 in. above and 3 in. below the ground line of trained bines; rarely cankers were seen with the lower margin above the ground. The primary symptom was a browning of the cortex in limited areas; later, infection girdled the stem and a liquid exuded, sometimes becoming foamy. Usually the cankers healed over. Top symptoms were a temporary wilt of the bine, yellowing of the lower leaves, and retardation of growth. It is believed that affected bines gave at least 75 per cent. normal yield.

All severe manifestations of the condition were associated with a combination of stripping, suckering, hilling, and irrigation, and experimental evidence indicated that the disease could largely be prevented by the avoidance of hilling: if hilling is practised, stripping and suckering should precede it by a period long enough for the wounds to heal. The author considers that the disease closely resembles citrus foam disease [*R.A.M.*, 29, p. 301].

Ciccarone (A.). **Primo contributo alla conoscenza dei micromiceti dell' Africa orientale.** [First contribution to a knowledge of East African microfungi.]—*Mycopathologia*, 5, 2–3, pp. 208–235, 1951.

This descriptive list of the fungi collected in East Africa in 1938 and 1939 includes many new species. *Plasmopara viticola* was present on vine [C.M.I. map No. 221] at Addis Ababa, Abyssinia, *Septoria lycopersici* on tomato [ibid., No. 108] in the same locality, *Melampsora lini* on flax [ibid., No. 68] at Acachi (Scioa), and *Puccinia coronata* on oats, *P. glumarum* [ibid., No. 97] and *Ustilago tritici* on wheat, all in Scioa. In Somaliland *Taphrina deformans* was recorded on peach

at Bunno [ibid., No. 192], *Kuehneola fici* on fig, *Hemileia vastatrix* on coffee [ibid., No. 5] in several localities, *P. helianthi* on sunflower [ibid., No. 195] at Malcò, *Sphacelotheca sorghi* and *S. cruenta* on sorghum [ibid., No. 220], *Graphiola phoenicis* on date palm [*R.A.M.*, 30, p. 585], *Pestalotia theae* and *Phoma theicola* on tea at Bonga, and *P. pruni-spinosae* on peach [C.M.I. map No. 223] in both countries. A host-fungus index is provided.

Ciccarone (A.) & Middleton (J. T.). **Two species of Pythium recorded from Venezuela.**—*Plant Dis. Reptr*, 35, 8, p. 387, 1951. [Multilithed.]

Pythium aphanidermatum is recorded for the first time on lucerne, having been isolated from collapsed seedlings at Maracay, Venezuela. It was also isolated from cowpea seedlings and caused extensive losses of tobacco seedlings in two areas in 1947–8. *P. arrhenomanes* was obtained from sorghum and from soil in which rice was growing [cf. *R.A.M.*, 27, p. 154]. This appears to be the first record of *P.* spp. in Venezuela.

Batista (A. C.). **Alguns fungos de fumagina de Pernambuco.** [Some sooty mould fungi in Pernambuco.]—*Mycopathologia*, 5, 2–3, pp. 147–172, 18 pl., 1951.

The author describes 36 species, most of which are new, of sooty mould fungi [cf. *R.A.M.*, 30, p. 390] occurring in Pernambuco [ibid., 26, p. 480]. They are in the genera *Trichomerium*, *Chaetopotius* n.gen., *Naetrocymbe*, *Meliola* [ibid., 30, p. 56], *Ceratospermopsis* n.gen., *Asterina*, and other genera of the Capnodiaceae, Meliolaceae, Microthyriaceae, and Micropeltaceae.

Cunningham (G. H.). **New Zealand Polyporaceae. 12. The genus Merulius.**—*Bull. Dep. sci. industr. Res. N.Z.* 83, 12 pp., 6 figs., 1950. [Received July, 1951.]

Continuing his studies on New Zealand Polyporaceae [cf. *R.A.M.*, 29, p. 584], the author describes six species of *Merulius*, including *M. nothofagi* n.sp. on the fallen branches of a number of broad-leaved trees, and *M. lacrymans*: all possess a monomitic hyphal system. The definitely porose species differ from *Poria* only in the continuity of the hymenium over edges of the dissepiments, the margins of which, in *Poria*, are always sterile.

Nusbaum (C. J.). **The distribution of Tobacco black shank in North Carolina in 1949 and 1950.**—*Plant Dis. Reptr*, 35, 8, pp. 358–360, 1 map, 1951. [Multilithed.]

Since 1946 the number of tobacco farms in North Carolina invaded by the black shank organism (*Phytophthora parasitica* var. *nicotianae*) [*R.A.M.*, 25, p. 190; 29, p. 438] has almost doubled every year. The disease is present in 54 of the 61 counties producing flue-cured tobacco, and in about one-fifth of the flue-cured tobacco farms. Infection has occurred every season since 1931 in Forsyth County, the original focus of infection in North Carolina [cf. ibid., 12, p. 145]; it has spread from this point and intensified in the central part of the area. In these localities resistant varieties [cf. ibid., 22, p. 411; 27, p. 390] are grown extensively and from 1949 to 1950 farm infestation increased by only 16 per cent., as against 53 per cent. for adjacent counties and 118 per cent. for other counties in the Old Belt. From the Pitt county infection centre, established in 1937, infestation has spread similarly, the increase from 1949 to 1950 being 17 per cent., while in adjacent counties it was 83 per cent. and in the remainder of the Eastern Belt 303 per cent. Before 1947 the Middle Belt was virtually free from black shank. Spread into this area probably took place from both the Old and Eastern Belts, and from 1949 to 1950 the increase in the number of infected farms was 227 per cent. In the Border Belt black shank appeared for the first time in 1950 in several scattered localities.

Bacterial wilt (*Pseudomonas solanacearum*) [cf. ibid., 25, p. 189] is prevalent in

certain areas of the Middle, Eastern, and Border Belts. *Fusarium* wilt (*F. oxysporum* var. *nicotianae*) [cf. ibid., 23, p. 460] is important in the Border Belt and the southern part of the Eastern Belt. In 1949, 844 farms had fields infested with both black shank and bacterial wilt, and in 1950 the figure was 1,546. Association of black shank with *Fusarium* wilt has been found on only a few farms, but in 1950 two farms had all three diseases.

Severin (H. H. P.). **Symptoms of the celery-calico virus on Tomato plants.**—*Hilgardia*, 20, 7, pp. 137–145, 7 pl., 1951.

During 1949 tomato plants naturally infected with celery calico virus [*R.A.M.*, 28, p. 514 and next abstract] were common at Berkeley, California. The virus from naturally infected celery was inoculated into Marglobe tomatoes. Symptoms of the disease are cleared veins and veinlets on the inoculated leaves; small to large, dark-green, circular areas, later chlorotic, on the intermediate leaves; green blister-like elevations accompanied by the distortion of the leaflets; and a lemon-yellow or orange discoloration of the lower leaves. The difference between the symptoms of celery calico virus [see above and below, pp. 18, 46] and those produced at a low temperature by the western cucumber mosaic virus [see next abstract] lies in the absence of filiform leaves and fern leaf symptoms in the former.

Severin (H. H. P.). **Multiple viruses of Tomato inducing fruit malformation and leaf symptoms.**—*Hilgardia*, 20, 7, pp. 109–136, 18 pl., 1950.

A serious outbreak of multiple virus infection of tomato plants, involving western cucumber mosaic virus [see above and below, pp. 18, 46] and tobacco mosaic virus [*R.A.M.*, 16, p. 132; 30, p. 492], occurred in the northern San Joaquin Valley, California, in 1938. In some fields infection ranged from 55 to 95 per cent. In studies at the University, Berkeley, viruses were separated by heating the virus extract to 83° C., the western cucumber mosaic being inactivated at 65°, while the tobacco mosaic virus, having a higher thermal inactivation point (90° to 95°) remained active, and by inoculating cucumber and vegetable marrow to secure the former virus and *Nicotiana glutinosa* for the latter. A description is given of the symptoms induced by the virus complex on the foliage, flowers, and the fruit of tomato and of those produced by the separate viruses on the leaves. Both this combination of viruses and also celery calico [see preceding abstract] plus tobacco mosaic caused abnormalities in the flowers and furrowing, doubling, tripling, quadrupling, and other extreme malformations of the fruit. There is no reliable symptom useful for distinguishing these multiple virus infections on tomato plants. Fruit malformation caused by the complex of common cucumber mosaic [ibid., 30, p. 250] with tobacco mosaic is similar but less severe than that caused by the two above-mentioned virus complexes.

Doolittle (S. P.) & Alexander (L. J.). **Occurrence of Tobacco etch virus on greenhouse Tomatoes in Ohio.**—*Plant Dis. Reptr*, 35, 8, pp. 351–353, 2 figs., 1951. [Multilithed.]

In the autumn of 1950 greenhouse tomato plants at Toledo, Ohio, showed symptoms of combined infection by tobacco mosaic and cucumber mosaic viruses [see preceding abstract]. Some plants also developed a brown, necrotic leaf spotting, a symptom observed later in other greenhouses at Toledo and in one at Columbus. Sap inoculations from these plants made at Beltsville, Maryland, showed that those with severe leaf necrosis were infected by a combination of tobacco mosaic, cucumber mosaic, and tobacco etch viruses [ibid., 30, p. 249]. From plants with slight leaf necrosis, tobacco mosaic and etch viruses were recovered. The etch virus could not be detected in leaves further up the stem than the necrotic ones and not showing these symptoms.

Linn (M. B.). **Tomato blight, its origin and control.**—*Canner*, 111, 23, pp. 11–13, 1950.

The available information on tomato blight [*Phytophthora infestans*], which nearly proved disastrous to the Illinois canning industry in the summer of 1950, is summarized in popular form. The first 1950 letter of the Late Blight Warning Service [*R.A.M.*, 28, p. 484; 30, p. 451], operated by the Bureau of Plant Industry, United States Department of Agriculture, in collaboration with the pathologists and other interested persons in each State, reported the occurrence of the disease near Homestead, Florida, about 23rd December, 1949, and it was probably already present in the Okeechobee City area on 20th November. On 24th February infection developed in Texas, and on 31st March it was observed on cold-frame plants at Tifton, Georgia. Fields in the latter State are largely supplied from Florida, and on 24th May blight was found at Adel, 25 miles south of Tifton. Other first recorded dates of blight development were 20th June in South Carolina and Tennessee, 23rd in Missouri, 27th in Indiana, 29th in Ohio, 12th July in Arkansas and Illinois, 13th in Kentucky, 18th in Delaware, and 20th in Maryland.

Under the comparatively dry conditions prevailing in the Ridgefarm area of Illinois in 1950, dusts applied by fixed-wing planes were reasonably effective in blight control, but spraying, preferably with machines of large capacity (400 to 600 gals.) covering 18 to 20 rows at one round trip, is the method of choice. The sprayer should be operated at 300 to 600 lb. pressure and deliver 135 to 200 gals. per acre. The nozzle disk aperture should be at least $\frac{5}{16}$ in. in diameter (No. 5). On the appearance of blight the standard State schedule of zerlate alternating at 10-day intervals with a fixed copper should be replaced by one consisting of either fixed copper alone or one of the following: dithane Z-78, dithane D-14 plus zinc sulphate, or parzate [ibid., 30, p. 634, *et passim*].

Wilhelm (S.). **Effect of various soil amendments on the inoculum potential of the Verticillium wilt fungus.**—*Phytopathology*, 41, 8, pp. 684–690, 1951.

This is a full account of further studies at the University of California, Berkeley, on the effect of soil amendments on the inoculum potential of *Verticillium albo-atrum*, using Bonny Best tomato seedlings as indicators [*R.A.M.*, 29, p. 540; 30, p. 292]. The amendments were applied in quantities giving roughly equal nitrogen levels (0·1 to 0·13 per cent. of the dry weight of the soil). One per cent. blood or fish meal reduced the infection index from 72 to 0, 1 per cent. ammonium sulphate from 81 to 8, cottonseed meal with 0·5 per cent. gypsum from 72 to 14, and cottonseed meal with 1 per cent. conifer wood sawdust from 81 to 15. Spergon failed to reduce the infection level.

Supplementary evidence in support of the reliability of the infection index method of measuring inoculum potential was secured by determining the infection indices of mixtures of infested and chloropicrin-fumigated soils in various proportions.

Finley (A. M.). **A comparative study of the morphological and cultural characteristics of races 1 and 2 of Fusarium oxysporum f. lycopersici (Sacc.) Snyder Hansen, and responses of Tomato varieties to them.**—Dissertation (Publication 1781), University of Missouri, 91 pp., 1950. [Abs. in *Biol. Abstr.*, 25, 5, p. 1390, 1951.]

In experiments carried out at the University of Missouri races 1 and 2 of *Fusarium oxysporum* f. *lycopersici* [*F. bulbigenum* var. *lycopersici*: *R.A.M.*, 30, p. 493] attacking tomato were grown on eight solid media to determine differences in growth habit, pigmentation, and microconidial lengths. On media where the racial differences could be detected race 1 always developed a more abundant

mycelial mat than race 2. Each differed in the quantity and colour of the pigments produced on the same medium, but no differences were detected when they were grown on infusion agars prepared from dried, ground leaves of the differential tomato hosts. Race 1 isolates consistently produced shorter microconidia than race 2, and the culture media did not influence their length significantly. Race 1 isolates also had a significantly higher growth rate on maize meal agar and produced greater total growth in liquid media.

A histological study of the reactions of a susceptible and a resistant tomato variety to each race, showed that neither penetrated intact living cells; both invaded the hosts only through vascular wounds. Resistance to race 1 appeared to be due to the formation of plugs in the xylem vessels adjacent to wounded surfaces. There was no evidence of plug formation in resistant plants attacked by race 2, nor when the plants were wounded but not inoculated. Plants not possessing the *Lycopersicon pimpinellifolium* resistance factor were readily invaded by both races.

Swank (G.). **Tomato rot due to a strain of Glomerella cingulata.**—*Plant Dis. Reptr*, 35, 7, p. 329, 1 fig., 1951. [Multilithed.]

In 1949 a monoconidial isolate of *Glomerella cingulata* from a diseased tomato fruit at Ohio State University produced perithecia in pure culture and was pathogenic to tomato fruits [*R.A.M.*, 29, p. 219] in inoculation tests but caused no lesions on apples [ibid., 30, p. 375]. It appears to be a strain which differs from *G. cingulata* only in pathogenicity.

Jain (A. C.). **A bacteria disease (canker) of Tomatoes, new to India,**—*Sci. & Cult.*, 17, pp. 46–47, 1951.

This description of the features of bacterial canker of tomato (*Corynebacterium michiganense*) [*R.A.M.*, 30, p. 250] is given as a result of its appearance in India [C.M.I. map No. 26] for the first time in 1949, when spotted tomatoes from the fruit market at Nagpur yielded cultures of the bacterium.

Mezzetti (A.). **La 'macchiettatura batterica' dei frutti di Pomodoro prodotta dalla Pseudomonas tomato (Okabe) Breed et al.** ['Bacterial speck' of Tomato fruits caused by *Pseudomonas tomato* (Okabe) Breed *et al.*]—*Ann. Sper. agr.*, N.S., 5, 1, pp. 95–110, 1 pl., 2 figs., 1951. [English summary.]

A detailed study at the Plant Pathology Station, Rome, of the bacterium responsible for fruit speck of tomatoes in Italy, first identified as *Pseudomonas punctulans* [*R.A.M.*, 30, p. 3], showed that it differed slightly from the published descriptions of *P. punctulans* and *P. tomato* [ibid., 28, p. 513]. Nevertheless the author considers that it should be named *P. tomato* and agrees with previous writers [loc. cit.] that *P. punctulans* should be reduced to synonymy.

Hawker (Lilian E.) & Fraymouth (Joan). **A re-investigation of the root-nodules of species of Elaeagnus, Hippophae, Alnus and Myrica, with special reference to the morphology and life histories of the causative organisms.**—*J. gen. Microbiol.*, 5, 2, pp. 369–386, 2 pl., 8 figs., 1951.

Anatomical and cytological studies in the Department of Botany, University of Bristol, demonstrated that the root nodules of *Elaeagnus macrophylla*, *E. angustifolia*, *Hippophae rhamnoides* [*R.A.M.*, 13, p. 590], *Alnus glutinosa* [ibid., 21, p. 35], and *Myrica gale* [ibid., 18, p. 335] are modified lateral roots. The enlarged cortical cells of an actively growing nodule contain the endophyte in several stages of development. The apical meristem is free from infection but the cells just behind show a plasmodial stage. In older parts spherical vesicles develop in *Elaeagnus*, *Hippophae*, and *Alnus*, and club-shaped bodies in *Myrica*. From these, small,

bacteroid granules are produced. There is some evidence that granules formed in different host cells fuse in pairs and possess some ability to migrate within the nodule and into the soil. No definite hyphae were seen in any of the nodules, but well-marked protoplasmic strands or lines of flow were present, particularly in the endophyte of *Myrica*.

The endophytes of *Elaeagnus* and *Hippophae* are morphologically indistinguishable and almost certainly belong to the same species. In experiments still in progress cross-infection took place between these two hosts. The endophyte of *Alnus* is closely related but differs in having larger vesicles and in the almost complete utilization of the protoplasm of the plasmodium during their formation. *Myrica*, which forms particles by the disintegration of the club-shaped bodies, may well be placed in a separate genus. The development of protoplasmic strands may be correlated with the degree of resistance of the host walls so that when this is considerable the area of penetration is reduced to a small pore and the flow of plasmodium thus canalized into narrow streams. No cruciform divisions were observed. The morphology and life-histories of the four endophytes suggest that they are best placed in the Plasmodiophorales.

In preliminary experiments *H. rhamnoides* seedlings grew to a height of 6 in. in sterile sand without additional nitrates and were in no way inferior to seedlings inoculated [with the endophyte] and having well-developed nodules, while those of *A. glutinosa* in garden soil were equally vigorous whether they bore nodules or not. Naturally and artificially inoculated seedlings of these plants do not develop nodules until they have reached a considerable size. The failure to isolate the endophytes by methods sufficing for the cultivation of root nodule bacteria suggests that the relationship may be one of obligate parasitism as with other species of *Plasmodiophora*.

Henry (B. W.). **Oak leaf blister, severe in south Mississippi.**—*Plant Dis. Reptr*, 35, 8, p. 384, 1951. [Multilithed.]

In May, 1951, *Taphrina caerulescens* [cf. *R.A.M.*, 27, p. 502; 29, p. 466] severely defoliated *Quercus nigra*, and affected *Q. phellos*, *Q. laurifolia*, and *Q. virginiana* in south Mississippi. In individual cases at Hattiesburg and Purvis approximately 50 to 60 per cent. of the foliage was shed by the end of May. Cool, wet weather in April may have favoured the disease, while hot, dry weather in May probably increased defoliation.

Some further reports on Oak wilt.—*Plant Dis. Reptr*, 35, 8, p. 383, 1951. [Multilithed.]

F. C. Strong reports that *Chalara quercina* [*R.A.M.*, 30, p. 635 and next abstract] has been found on a red oak [*Quercus* spp.] in Cass County, Michigan, this being the first authentic record of the disease from this State.

F. R. Lancaster and A. F. Rumph isolated *C. quercina* from three *Q. palustris* trees on one property in Sewickley Heights, Allegheny county, Pennsylvania [ibid., 30, p. 494]. This is believed to be the first record of the disease from western Pennsylvania.

True (R. P.), Craig (F. W.), & Barnett (H. L.). **Oak wilt found in West Virginia.**—*Plant Dis. Reptr*, 35, 8, p. 382, 1951. [Multilithed.]

A State-wide survey has shown oak wilt (*Chalara quercina*) [see preceding abstract] to be present in five counties in West Virginia. The available evidence suggests that the disease has been present, though unrecognized, for several years. Though widespread, it is not severe enough at present to threaten the early loss of any considerable volume of timber.

Kláštersky (I.). **A cowl-forming virosis in Roses, Lime-trees and Elm-trees.**—*Stud. bot. Čechosl.*, 12, 2, pp. 73–171, 134 figs., 1951.

This is an account of further studies in the Botanical Department of the National Museum, Prague, on the cowl-forming virus of roses [cf. *R.A.M.*, 29, p. 28]. In 1949, 19 additional *Rosa* spp. were affected besides those previously involved [loc. cit.]. In 1950 the majority of these specimens showed no symptoms at all although there were three plants newly affected, one severely.

To date 68 lime trees [ibid., 30, p. 14] of the species *Tilia cordata*, *T. platyphyllos*, and *T. macrophylla* are affected in the vicinity of Český Krumlov and Zlatá Koruna, and numerous reports have been received from other localities. On the European elm cowl-shaped leaves were observed at Hostinné and Kunratice. The author suspects that in the latter case the trees were infected from roses near by. In experiments in Prague, at Ďáblice near Prague, and at Kunratice Castle, in which 13 ten-year-old *T. platyphyllos* were grafted with scions from affected trees, perfect cowl-shaped leaves appeared on two of the stocks and nearly all developed aberrations of different kinds. Later, symptoms were observed on two similar trees which had not been grafted.

Příhoda (A.). **Keřovitý růst Lipových sazenic jako následik napadení houbon Pyrenochaeta pubescens Rostr.** [Bushy growth of Lime shoots caused by attack of the fungus *Pyrenochaeta pubescens* Rostr.]—*Ochr. Rost.*, 23, 4, pp. 366–368, 1 fig., 1950. [Russian and French summaries.]

Lime (*Tilia*) shoots near Kyšperk, Czechoslovakia, infected by *Pyrenochaeta pubescens* [*R.A.M.*, 13, p. 10; 15, p. 618], developed over a period of five years a bushy appearance owing to the girdling, drying, and wilting of the main stems and consequent abnormal production of secondary branches. Normal trees can be produced by regular excision of the diseased parts in August.

Harvey (J. M.). **An anthracnose disease of Umbellularia californica.**—*Madroño, Calif.*, 11, 4, pp. 162–171, 2 pl., 1951.

A fungus of the genus *Kabatiella* was consistently associated with diseased leaves of *Umbellularia californica*, widely planted as a shade tree in California. Brown, necrotic patches appear near the tip, margins, or base of the leaf and may eventually cover the whole surface. The epidermis is often roughened by the eruption of numerous acervuli. The pathogen was studied in culture and its pathogenicity established by inoculation experiments. The morphology of the closely related fungus, *Protocoronospora phoradendri* [*R.A.M.*, 20, p. 210], freshly isolated from *Phoradendron flavescens* var. *macrophylla* in California, was compared with it. The latter fungus is transferred to *Kabatiella* as *K. phoradendri* since the genus *Protocoronospora* is invalid. The isolate from *U. californica* is named *K. phoradendri* f. *umbellulariae* n.f., since it differs from the species in the size and shape of the conidia (24·2 by 3·1 μ), temperature range, and host reaction.

Rol (R.). **Les Peupliers et les principales essences forestières de l'est des États-Unis. Rapport de mission mai–juin 1950.** [Poplars and the principal forest-tree species in the eastern United States. Report of a mission, May–June, 1950.]—*Ann. École Eaux For. Nancy*, 12, 2, pp. 527–637, 18 pl., 3 maps, 1951. [English summary.]

In accordance with a resolution passed by the council of the European Organization for Economic Co-operation in January, 1950, a group of experts from Western Europe toured the eastern United States to study the growth of poplars and fast-growing artificial hybrids and the conditions under which cottonwood poplars are produced. They found that artificial hybrids were much more susceptible to fungus attack than natural stands. Wetwood, which attacks the latter, appears to

be similar to the disease caused by *Erwinia nimipressuralis* on elm [*R.A.M.*, 25, p. 239]. *Hypoxylon pruinatum* [ibid., 24, p. 255] causes serious losses in natural stands of aspen (*Populus tremuloides* and *P. grandidentata*); *Didymosphaeria populina* [ibid., 22, p. 503] attacks aspens [cf. ibid., 30, p. 396], black poplar (*P. deltoides*), and hybrid Italian poplar. *Mycosphaerella populorum* [ibid., 25, p. 426], *Dothichiza populea* [ibid., 22, p. 183], *Valsa sordida* [ibid., 10, p. 349; 30, p. 637], *Melampsora abietis-canadensis*, and *M. medusae* [ibid., 30, p. 636] are common on artificial hybrids.

The lower resistance exhibited by these hybrids in the areas visited is attributed to such factors as planting rapidly growing clones too closely in soil that is poor, too dry, or too acid, and allowing too much spontaneous vegetation to develop.

Semaine internationale du Châtaignier, septembre 1950. [International Chestnut tree week, September, 1950.]—*Bull. tech. Châtaignier* (*École Eaux For. Nancy*) 3, 174 pp., 2 pl., 17 figs., 2 graphs, 4 maps, 1951.

On p. 23 of this publication it is stated that the Bouche-Rouge chestnut variety (also known as Grosse Bouche or the Vesseaux chestnut) is resistant to diseases, except rust [cause unspecified], which induces leaf fall late in the season and adversely affects maturation. [On p. 57 reference is made to leaf disease due to *Sphaerella* [*Mycosphaerella*] *maculiformis*: cf. *R.A.M.*, 20, p. 558; 28, p. 146; perhaps this is the disease referred to as 'rust'.]

On p. 47 J. Fenart states that ink disease [*Phytophthora cambivora* and *P. cinnamomi*: ibid., 30, p. 349] has been present in Corrèze, France, for fifty years and its depredations have spread until vast areas have become affected, especially in the west. The rate of spread declined after the war, probably owing to drought, but has become more rapid during the past two or three years.

R. Rol (p. 57) records that an investigation in 1949 showed the main cause of the decline of fruit chestnuts in France to be the abandonment of cultural care. But there are also five chief areas of ink disease, viz., Brittany, Limousin, Rouergue, the southern region of the Cévennes, and Corsica. Coppice trees are seldom attacked by *P. cambivora*, *Cytodiplospora castaneae* [*Cryptodiaporthe castanea*: ibid., 16, p. 845] being more common on these. The same writer in an article on the fungus diseases of the chestnut in France (pp. 97–101) states that ink disease does not appear to be present east of the Rhone but occurs in most plantations in the south and west. It is most active in Rouergue, where losses have increased considerably in the last twenty years. In the Cévennes the infected area is to the south of Ardèche and extends a little way into Gard and Lozère, but the disease seems to have lost much of its virulence and ability to spread. In Limousin infection is intense and the area planted with chestnuts has been reduced by two-thirds in a century, but at present the disease is declining. Near Redon three-quarters of the chestnut plantations have disappeared; the disease is still active and is spreading northwards. In Corsica it is present almost everywhere, but there are no definite foci of infection.

A study of the geographical factors involved shows that ink disease develops chiefly in areas with a maritime climate, which accounts for its persistence and virulence in upper Brittany and its diminution in the Cévennes. The disease is concentrated in bottoms of valleys and is not found at altitudes over 500 or 600 m. It is most common in situations with a southerly aspect. High soil humidity appears to be an essential condition, though the disease is serious also in dry, superficial soils poor in mineral constituents, as such soils reduce the vitality of the trees. *C. castanea* causes stem cankers on coppice chestnuts in Deux-Sèvres, in the forest of Hermitain, and near Urdos in the Basses-Pyrenées.

A paper by H. Darpoux (pp. 58–59) on canker (*Endothia parasitica*) [ibid., 30, pp. 5, 438] has already been noticed from another source. J. Ginet contributes an

article on the same subject (pp. 112–113]. Although *E. parasitica* has not been found in France, there have been numerous cases in Ardèche of young Japanese chestnuts (*Castanea crenata*) or transplanted hybrids of *C. crenata* with all the symptoms described for the disease.

G. Vasquez (pp. 59–61) states that in Spain ink disease [ibid., 29, p. 234] is chiefly found in humid to very humid temperate or cold temperate climates, where the soil has an abundant, permanent, dead cover. Such conditions are found in the north and north-west of Spain; in Catalonia and Andalusia the disease is present only in cool, humid areas.

P. Urquijo Landaluze, dealing (pp. 117–126) with further experiments at the Phytopathological Station, Corunna, Spain, on the chemical control of ink disease [loc. cit.], states that copper aceto-arsenite may prove toxic to plant growth and cannot be recommended until further tests have been made. Sodium arsenite in solutions up to 1 in 10,000 killed the mycelium of *P. cinnamomi* and inhibited its growth at 1 in 100,000. Sodium arsenite at the same concentrations was also inhibitory. A proprietary arsenical product, inyectauzol, containing no copper was inhibitory at 1 in 10,000, and killed the mycelium in stronger doses. At 1 in 1,000 it was non-injurious to chestnut roots. Treatment advised at present is to lay bare the trunk and largest roots to a depth of 40 or 50 cm. and carefully brush away all adhering soil. After an interval the exposed parts should then be sprayed with water or preferably with an adhesive. The wetted surface is then dusted by means of bellows or a knapsack duster with an insoluble copper salt, the following formula being recommended: copper carbonate or oxychloride 2 parts; copper oxide 1 part; and kaolin or plaster 2 parts. When the entire surface of the exposed bark has been covered, the soil is replaced carefully after an interval but before rain. This method was applied preventively at first, but evidence has since been obtained that it is curative if the disease is not too severe. Copper carbonate was found to adhere to the trees for at least five years in some cases and the effect may be expected to persist for at least six or eight years.

Novàk (J. B.) & Berný (M.). **Alternaria nucis Moesz na plodech Ořešákn vlašského (Juglans regia).** [*Alternaria nucis* Moesz on Walnut (*Juglans regia*) kernels.]—*Ochr. Rost.*, 23, 4, pp. 368–369, 1 fig., 1950.

Walnut kernels in Czechoslovakia are commonly affected by *Alternaria nucis* [*R.A.M.*, 16, p. 20], causing some economic losses. Infection probably takes place when the pericarp bursts, especially during wet weather, but it may occur at flowering or shortly afterwards.

Příhoda (A.). **Nová choroba Borového jehličí v Čechách.** [A new disease of Pine needles in Bohemia.]—*Ochr. Rost.*, 23, 4, pp. 363–366, 2 figs., 1950. [Russian and French summaries.]

A *Pinus aristata* tree in the Kostelec-on-Černými forest, Czechoslovakia, was affected by complete or partial drying of the needles. A fungus isolated from them was determined tentatively as *Stagonospora pini*. The pycnidia were 100 to 200 μ in diameter, and the spores 16 to 26 by 2·5 μ.

Konev (G. I.). **Lophodermium pinastri Chev.** на хвое Кедра в прибайкалье. [*Lophodermium pinastri*. Chev. on Cedar needles in the Baikal region.]—Ботан. журн. [*J. Bot. U.S.S.R.*], 35, 6, pp. 664–666, 1 fig., 1951.

Lophodermium pinastri [*R.A.M.*, 10, p. 416] is reported to be largely responsible for the dying of cedar needles, of both young and old trees, in the Baikal region of the U.S.S.R.

Krstić (M.). Нова фитопатолошка појава у нашем шумарству; описање иглица Дуглазије. [A new plant disease manifestation in our forests; description of Douglas Fir needles.]—Заштита биљака [*Plant Prot., Beograd*], 5, pp. 73–74, 1951. [French summary.]

The author identified *Rhabdocline pseudotsugae* [C.M.I. map No. 52] on Douglas fir (*Pseudotsuga douglasii* [*P. taxifolia*] var. *viridis*) [*R.A.M.*, 17, p. 144; 24, p. 128] at Kosakovo, Yugoslavia, near the Austrian frontier. The area invaded by the parasite is about 1·5 ha. This is the first record of the disease in the country.

Campbell (W. A.). **The occurrence of Phytophthora cinnamomi in the soil under Pine stands in the southeast.**—*Phytopathology*, 41, 8, pp. 742–746, 1 map, 1951.

Out of 61 soil samples from plots of pine (mostly *Pinus taeda*, some *P. echinata*, mixtures of these two species, *P. caribaea*, *P. palustris*, and mixed hardwood-pine) stands in seven south-eastern States of the American Union (including South Carolina), 30 yielded *Phytophthora cinnamomi* [*R.A.M.*, 30, p. 396], which has been associated with little leaf disease of *P. echinata* [loc. cit.]. The frequency of the fungus in South Carolina soils studied in relation to the occurrence of little leaf was 91 per cent. No correlation could be discerned, however, between the relative abundance of the pathogen in these plots and the severity of the disease. *P. cinnamomi* was virtually ubiquitous outside the little leaf area in the south-east, where it was found in localities remote from any known connexion with a recognized disease.

Boulton (E. H. B.). **Notes on the control of wood-destroying fungi.**—*Timber & Plywood*, 99, 2578, p. 533, 1950.

This paper, read before the Royal Institute of Chartered Surveyors on 4th December, 1950, comprises a brief, popular note on the life-history of the dry rot fungus (*Merulius lacrymans*) [*R.A.M.*, 29, p. 547] and practical directions for its detection and control [ibid., 29, p. 594].

Roth (E. R.). **The viability of spores and mycelium of Endoconidiophora virescens on Sugar Maple lumber.**—*Plant Dis. Reptr*, 35, 8, pp. 379–381, 1 fig., 1951. [Multilithed.]

In a test carried out in North Carolina in June, 1949, to ascertain how long the spores and mycelium of *Endoconidiophora virescens* [*R.A.M.*, 24, p. 212; 29, pp. 548, 596] would remain viable in or on cut lumber of sugar maple [*Acer saccharum*] affected by sapstreak, spraying the boards with permatox 10 S [ibid., 24, p. 347; 25, p. 375] at the rate of 10 lb. per 100 gals. prevented the development of spores and mycelium on the surface of infected boards. Kiln-drying of unsprayed boards killed the spores and mycelium, but the time that elapsed between cutting and drying permitted the development of heavy surface discoloration due to the fungus. End-racking of unsprayed boards greatly reduced external stain, which was confined to the portions of the boards nearest the ground. In bulk- and sticker-piled unsprayed green boards whole boards became heavily stained. Two months after the logs had been cut into timber the spores and mycelium of *E. virescens* were no longer viable whatever the treatment. It is concluded that adequately seasoned or fungicide-treated sapstreak lumber can safely be sent to other sugar-maple-growing areas with little risk of spreading infection.

Blew (J. O.) & Olson (W. Z.). **The durability of Birch plywood treated with wood preservatives and fire-retarding chemicals.**—*Proc. Amer. Wood Pres. Ass.*, 46, pp. 323–338, 11 graphs, 1950.

Yellow birch plywood made with eight different glues and treated with seven

standard wood preservatives and three fire retardants was exposed to various moisture and humidity conditions for six years in durability tests by the United States Forest Products Laboratory. Joint strength and wood failure tests indicated that the treatments and preservatives generally had no injurious effect on the quality of the joints. The oils in particular generally tended to improve the durability of casein-glued plywood. Fire retardants containing ammonium salts appeared to have been detrimental to plywood made with some glues, especially when exposed to damp conditions.

MATHIESEN (A[INO]). **Einige neue Ophiostoma-Arten in Schweden.** [Some new *Ophiostoma* species in Sweden.]—*Svensk bot. Tidskr.*, 45, 1, pp. 203–232, 8 figs., 1951. [English summary.]

This is a critical study of seven species of *Ophiostoma*, of which four are new to science and all are new to Sweden. *O. canum* [see next abstract], a well-defined species, is one of the most common and destructive agents of blue stain on pine wood following attack by *Blastophagus minor* [cf. *R.A.M.*, 30, p. 498]. *O. polonicum*, an associate of the bark beetles *Ips typographus* [ibid., 18, p. 488], *Acanthocinus aedilis*, and *Tetropium* sp., also causes intensive discoloration of spruce but is of comparatively rare occurrence.

O. clavatum n.sp. is a constant concomitant of *I. acuminatus* in pine stems. It is characterized by a hyaline, later blackish-green or blackish-brown mycelium, consisting of irregularly branched hyphae, 2·5 μ in diameter; hyaline secondary conidia, 5·1 to 7·4 by 2·2 to 4·2 (mean 6·3 by 2·9) μ; dark brown, subspheroid, smooth perithecia, 127 to 212 by 127 to 237 (166 by 177) μ, with black beaks, 453 to 830 by 28·3 to 45·3 μ at the base and 11·3 to 19·8 μ at the apex, mean 566 by 35·9 by 15·8 μ; the ostiole surrounded by 8 to 16 curved brown cilia 14·8 to 81·2 (52·2) by 2·8 μ; reniform or ellipsoid ascospores 3·3 by 1·4 μ; clavate, often branched, graphioid coremia 150 to 500 μ in height, with a short, rigid, brown stipe, 40 to 200 μ in thickness, and a hyaline, claviform capitulum; synnematous hyphae dark-coloured below, paler above, branching repeatedly in verticils; and ellipsoid conidia, 2·7 to 3·7 by 1·7 to 2·1 (3·2 by 1·9) μ, congested with mucus.

RENNERFELT (E.). **Über den Zusammenhang zwischen dem Verblauen des Holzes und den Insekten.** [On the connexion between the blueing of wood and insects.] —*Oikos*, 2, 1, pp. 120–137, 4 figs., 1 map, 1950.

More than half the samples of corticated pine wood infested by *Blastophagus minor* yielded *Ophiostoma canum* [*R.A.M.*, 14, p. 274 and preceding abstract] and *Trichosporium tingens* [ibid., 14, p. 273] on examination at the Swedish Forest Research Institute, Stockholm, while other blueing fungi, e.g., *O.* [*Ceratostomella*] *coerulea* [ibid., 26, pp. 321, 369] and *O.* [*C.*] *pini* [ibid., 26, p. 322], were of more sporadic occurrence and cannot be regarded as commensals of the insects. Quite fortuitous, moreover, is the connexion with the bark beetles of aerial blue-staining contaminents, such as *O.* [*Ceratocystis*] *piceae* [ibid., 30, p. 289], *Pullularia pullulans* [ibid., 30, p. 7 *et passim*], moulds representing at least nine genera, including *Botrytis*, *Cephalosporium*, *Mucor*, *Penicillium*, and *Trichoderma*, and numerous yeasts. *O. canum* and *Trichosporium tingens* were isolated from larvae and imagines as well as from adult beetles.

No blueing fungi were consistently encountered in the galleries of *Blastophagus piniperda*. *Ceratostomella pini* was isolated from a number of samples, but it is thought to have been air- rather than insect-borne. The same species may also be associated with *Ips acuminatus*. Material from the galleries of *I. typographus* in spruce yielded predominantly *O.* (*Leptographium*) *penicillatum* [*C. penicillata*: ibid., 15, p. 827], besides many yeasts.

Forest Policy, Law, and Administration.—*FAO For. & For. Prod. Stud.* 2, iv+211 pp., 1950. $2.

This study (originally written in French by T. François) was undertaken on instructions from the Conference of the Food and Agriculture Organization of the United Nations as part of the work of the Forestry and Forest Products Division and represents the views of the Division. It is divided into three main parts dealing, respectively, with forest policy, law and regulations, and administration. In the section dealing with protection against pests and diseases (pp. 93–95) it is pointed out that against endemic diseases only sound silvicultural methods and the use of exploitation methods which will remove the produce extracted in the shortest possible time are likely to be preventive. Except in forests managed by the government the law can do no more than undertake propaganda. It can, however, take definite measures to prevent the introduction of dangerous diseases into a country, and it should assure the existence of a service capable of making the necessary decisions and of advising on products whose entry should not be allowed. When an epidemic outbreak renders the immediate felling of trees imperative, the law should appoint in advance the authorities responsible for issuing orders and supervising their execution, and should indicate the extent to which such orders apply to forests not under government control.

Ellis (N. K.). **The effect of growing Peppermint on the persistence of clubroot of Cabbage in muck soil.**—Dissertation (Publication 1737), Michigan State College, 84 pp., 1950. [Abs. in *Biol. Abstr.*, 25, 5, p. 1394, 1951.]

Club root (*Plasmodiophora brassicae*) [*R.A.M.*, 28, p. 379] was greatly reduced or eliminated from cabbages in Michigan when they were grown after peppermint [*Mentha piperita*] which had been cropped for one to three years. Cabbage yields were increased from 6·6 tons per acre on club root infested soil to 23·5 tons on soil planted with peppermint for one year. In soil removed from the field plots cabbage was 100 per cent. infected with club root when it followed cabbage for three years and was 4 per cent. infected after peppermint for the same period. It appears that some part of the peppermint plant, perhaps the stolon, is indirectly responsible for the production of substances antagonistic to *P. brassicae*.

Severin (H. H. P.) & Tompkins (C. M.). **Transmission of Radish-mosaic virus by aphids.**—*Hilgardia*, 20, 11, pp. 191–205, 7 pl., 1950.

In studies on radish mosaic virus [*R.A.M.*, 18, p. 427; 28, p. 318] at the California Agricultural Experiment Station, Berkeley, various species of aphids, vectors of the virus, were found to form two groups; those which multiply on radish under natural conditions, such as *Brevicoryne brassicae*, *Rhopalosiphum pseudobrassicae*, *Myzus ornatus*, and *M. persicae*, and those which do not multiply on radish in the greenhouse, such as *Aphis apii*, *A. ferruginea-striata*, *A. gossypii*, *A. rumicis*, *Cavariella aegopodii*, *Macrosiphum pisi*, *Myzus circumflexus*, and *M.* [*Macrosiphum*] *solani*. Tests showed that, with some exceptions, in short feeding intervals percentages of transmission were higher with previously non-infective, starved aphids than with unstarved, infective aphids. Mechanical inoculation (60 per cent.) was more efficient than aphid transmission (average for 11 species 56 per cent.). The virus was transmitted by aphids of the first group during the first day, but not during the second and third days and thus appears to be of the non-persistent type. With hourly transfer tests infection took place within the first three hours after feeding commenced.

Thomas (W. D.) & Graham (R. W.). **Longevity of the red node virus in Beans.**—*Phytopathology*, 41, 8, pp. 764–765, 1951.

The red node virus of beans [*Phaseolus vulgaris*] has been reported to lose its

infectivity within 48 hours at 22° C. *in vitro* and in dry tissue after 30 days [*R.A.M.*, 30, p. 597]. However, recent field observations in Colorado aroused the suspicion that it was being transmitted by the cultivator blades from the residues of diseased plants in the soil. Details are given of experiments undertaken to confirm the validity of this hypothesis, the accumulated data from which show that the virus may remain active for at least seven months in dried or frozen bean tissue. It is surmised that such material may serve as a source for the mechanical transmission of the virus to plants of a subsequent crop.

Watson (R. D.). **Method for use of soil fumigants to control root rot and seed decay in Peas and Beans.**—*Plant Dis. Reptr*, 35, 7, pp. 324–325, 1 fig., 1951. [Multilithed.]

A description is given of a new method of application of soil fumigants with the seed for the control of root rot of peas and beans [*Phaseolus vulgaris*] caused by *Fusarium* spp. and other fungi [*R.A.M.*, 22, p. 126; 27, p. 155; 30, p. 7]. A pressure tank attached to the planter provides a drip of fumigant synchronizing with seed deposition. Used in greenhouse and field tests at the Idaho Agricultural Experiment Station, Moscow, good stands, yields, and control of root rot were obtained with formaldehyde (1·5 gals. per acre per 2 ft. row spacing), while shell product CBP-55 (formerly OS 840) [ibid., 29, p. 371] was effective over a wide range of concentrations and up to 2 gals. per acre caused no injury under field conditions.

Swank (G.). **Alternaria leaf spot and dieback of Snap Bean ; a new disease in central Florida.**—*Plant Dis. Reptr*, 35, 7, pp. 330–332, 2 figs., 1951. [Multilithed.]

This is a preliminary report on the symptoms, pathogenicity, and morphology of a species of *Alternaria* causing leaf spot and dieback of snap bean (*Phaseolus vulgaris*) [cf. *R.A.M.*, 20, p. 543; 26, p. 405] from the Central Florida Experiment Station, Sanford. The disease is so far confined to the Sanford-Zellwood area. It starts on the leaflets as small, irregular, reddish brown flecks with a dark brown or black border. These become circular, concentrically zoned lesions, 1·5 cm. in diameter, the centre being light brown and the older portions often falling out. Similar lesions occur on the stems, petioles, and peduncles, infection of the last often causing abscission of flowers and pods. Leaf lesions often coalesce forming large areas of dead tissue. Individual leaflets may die back from the tip or margin, the uninfected portion of the leaf appearing perfectly healthy. Often the central growing point of the plant is killed, though this is only detected by close examination.

On potato dextrose agar the mycelium is aerial, cottony, and dark grey. The body of the conidium is 28·7 to 80·2 by 12·3 to 20·5 μ with 4 to 7 transverse and 0 to 3 longitudinal septa. The beak is 20·5 to 73·8 μ long with 0 to 4 transverse septa, the total length of the spores being 49·2 to 154 by 12·3 to 20·5 μ.

Cox (R. S.) & Hyre (R. A.). **Overwintering of Phytophthora phaseoli on infected Lima Bean pods in the soil.**—*Plant Dis. Reptr*, 35, 8, p. 354, 1951. [Multilithed.]

In experiments at the Delaware Agricultural Experiment Station downy mildew (*Phytophthora phaseoli*) [cf. *R.A.M.*, 29, p. 204] developed on Lima bean [*Phaseolus lunatus*] plants grown in pots after diseased pods had been buried in the soil the previous year, the pots then being overwintered outdoors and sown in the greenhouse on 5th June, 1951. Mildew developed on 1st July and was also found on the 12th in a field plot where diseased material had been ploughed under in the preceding autumn. No infection occurred in the controls and none was found in a survey of the commercial Lima bean areas of the State at that time.

GEESEMAN (G. E.). **Inheritance of resistance of Soybeans to Peronospora manshurica.**—*Agron. J.*, 42, 12, pp. 608–613, 1950.

A tabulated survey is given of studies conducted at the Wisconsin Agricultural Experiment Station in 1947–8 to determine the mode of inheritance of factors for resistance of soybeans to three physiologic races of downy mildew (*Peronospora manshurica*) [*R.A.M.*, 30, p. 94].

In susceptible × resistant crosses resistance to races 1 and 2 appeared to be controlled by one pair of factors and was partially dominant, whereas the reactions of the progeny of two susceptible varieties suggested two complementary factors. Resistance to race 3 was governed by a single factor pair in the cross Dunfield × Illini. Two factors Mi_2 and Mi_R, conditioned resistance in the cross Mukden × Richland, the former factor being epistatic to the latter. Two complementary factors (Mi_1 and Mi_2) plus Mi_R conferred resistance in the cross Illini × Richland. The Mi_R factor was hypostatic to the others. Independent segregation of the three genes was indicated.

The comparison of the F_3 reactions to the three races indicated that the same major factors regulated resistance to all. The presence of two or more dominant genes (M_1 M_2) confers high resistance to races 1 and 3 and slight susceptibility to race 2. Mi_R, influencing reaction to race 3, appears to be recessive in Mukden and dominant in Richland. The genotypes of the susceptible Illini, Richland (semi-resistant to race 3 otherwise susceptible), and the three resistant varieties, Dunfield, Chief, and Mukden, are given.

SHERWIN (HELEN S.) & LEFEBVRE (C. L.). **Reaction of Cowpea varieties to bacterial canker.**—*Plant Dis. Reptr*, 35, 7, pp. 303–317, 4 figs., 1951. [Multilithed.]

A description is given of inoculation tests carried out in a greenhouse at about 27° C. at the Division of Forage Crops and Diseases, U.S. Bureau of Plant Industry, Soils, and Agricultural Engineering, to determine the reaction of cowpea varieties to bacterial canker (*Xanthomonas vignicola*) [*R.A.M.*, 28, p. 577]. From Texas specimens both white and yellow isolates were obtained but only the yellow were pathogenic. Similar yellow colonies were produced by isolates from infected Florida plants. Response of both these yellow strains, when grown on different media, was such that they could be identified as *X. vignicola*. Various inoculation methods were tried, but the stem-stabbing method, i.e., stabbing the stem twice with an arrow-pointed needle through a bacterial smear just below the primary leaves when the first trifoliate leaves were starting to unfold, proved the most effective and was adopted for testing large populations because it consistently produced severe symptoms in the shortest time.

Of the 351 seed lots tested Brabham, Buff, Iron, Six-weeks-Ala (SCP No. 9), Suwannee, and Victor were considered immune or highly resistant [loc. cit.]; Brown Crowder, Conch, Michigan Favourite, Nassau, and New Era moderately resistant, and Alabunch, Black, Blue Goose, Brown Crowder (Jackson 21, SCP No. 7), Cream Crowder and a selection from it, Crowder (L-sp.), Red Speckled Crowder, Speckled Crowder, Groit, and Holstein (almost black) moderately susceptible. Two strains of *X. vignicola* were found. Groit and New Era were resistant to moderately susceptible to strain 1 at 27°, while strain 2 caused typical, severe bacterial canker symptoms. The growth of the organism and disease development were favoured by comparatively high temperatures.

SEVERIN (H. H. P.). **Symptoms of Cucumber-mosaic and Tobacco-ringspot viruses on Celery.**—*Hilgardia*, 20, 14, pp. 267–277, 6 pl. (1 col.), 1950.

The sequence of symptoms produced by celery calico [see above, pp. 18, 34],

western cucumber mosaic [loc. cit.], common cucumber mosaic, and tobacco ring spot viruses on Golden self-blanching celery [*R.A.M.*, 28, p. 265] were studied at the University of California. Western cucumber mosaic is usually marked by the development of cleared veins and veinlets on the youngest leaves, and later slightly elevated green areas surrounded by cleared veinlets. Sometimes, however, interveinal chlorotic areas, which later coalesce, develop on intermediate leaves instead. Green islands in the yellow areas, reminiscent of celery calico [ibid., 15, p. 191], appear on the leaflets, with yellow or orange marginal discoloration of the oldest leaves. These develop green, blister-like elevations and the leaflets, often dwarfed, twisted, and curled, are sometimes quite green and normal on one side of the rachis and chlorotic and twisted on the other. In the late stage of the disease necrosis may spread from the veins throughout the interveinal tissue. Necrosis of the petioles, while rare on experimentally infected plants, is common on naturally infected celery.

Symptoms of common cucumber mosaic [ibid., 30, p. 20] are very similar to those of western cucumber mosaic. The chief difference in the early stages is that here the youngest leaves have shortened petioles and become puckered, crinkled, and cupped downward, while the outer petioles are horizontal instead of upright, giving the top of the plant a flattened appearance. Wilting and drying of the leaflets follow the severe necrosis of the younger petioles. Small, interveinal, circular, chlorotic areas present on the intermediate leaves are even more conspicuous on older ones, where they fuse later to form yellow vein bands or zigzag bands across the leaflets, which frequently have yellow margins. Green islands surrounded by yellow rings or embedded in chlorotic areas on the intermediate and older leaves are a symptom of celery calico and western cucumber mosaic also, but here the intermediate leaves, gradually assuming a yellow or orange colour, finally become chlorotic, while the margins of the outer leaves turn white. In the late stage of the disease the same veinal necrosis occurs, but there are in addition rust coloured, necrotic areas on the leaflets, which are also a symptom of tobacco ring spot virus. Necrosis of the leaflets follows. The severe stunting of the plant distinguishes common cucumber mosaic from the other viruses on celery.

Early symptoms of tobacco ring spot are the same as those described above but in addition numerous circular, chlorotic areas, each with a rust coloured, necrotic centre, appear on the youngest and intermediate leaves, the latter later developing yellow or orange discolorations and becoming chlorotic. The outer or older leaves often become puckered, with many circular, yellow spots and slightly elevated, green areas.

While celery calico is present in all the large celery districts in California, common cucumber mosaic and tobacco ring spot have not been found there under natural conditions.

Costa (A. S.). **Mancha anular do Amendoim causada pelo vírus de vira-cabeça.** [Ring spot of Groundnut caused by the spotted wilt virus.]—*Bragantia, S. Paulo*, 10, 2, pp. 67–68, 1 pl., 1950. [English summary.]

Further studies on the ring spot of groundnuts reported from São Paulo, Brazil, in 1941 [*R.A.M.*, 21, p. 119] have shown it to be due to the tomato spotted wilt virus. Groundnuts inoculated with infective material from lettuce contracted the disease and the virus was recovered by means of retro-inoculation into tobacco. It is suggested that the rosette or top necrosis of unknown origin affecting groundnuts in Argentina (*Inform. Direcc. Invest. agric., B. Aires*, 3, pp. 2–3, 1950) may also be due to the spotted wilt virus, which occurs on tomato and tobacco in the same country [*R.A.M.*, 28, p. 55 *et passim*].

Bunting (A. H.). **Agricultural research in the Goundnut scheme, 1947–51.**—*Nature, Lond.*, 168, 4280, pp. 804–806, 1951.

In crop disease surveys by the Scientific Department, Overseas Food Corporation, Kongwa, Tanganyika, crown rot of groundnuts [*Aspergillus niger*: *R.A.M.*, 19, p. 196; cf. 30, p. 444] received most attention as it was feared to be cumulative, but it has not proved to be so. Advances have also been made towards the control of *Sclerotium* foot rot [*S. rolfsii*: ibid., 25, p. 199] and *Cercospora* leaf spot [*C. arachidicola*: ibid., 27, p. 158]. Possibilities of a new and important means of biological control of the rosette [virus] disease [see above, p. 7] and its aphid vector (*Aphis craccivora*), based on the provision of alternate hosts for the predators of the vector, are under study now. It was found that certain long-season varieties exhibit marked seed dormancy, which delays the appearance of volunteer plants for many months, thus automatically providing a close season and preventing the carry-over of the disease and its vector. Some of these long-season types, as suggested by recent studies, are also resistant to some forms at least of rosette disease.

Quirós Calvos (M.). **Chaetoseptoria wellmanii Stev., una enfermedad de las leguminosas.** [*Chaetoseptoria wellmanii* Stev., a disease of legumes.]—*Suelo tico*, 4, 20, pp. 137–139, 2 figs., 1950.

A leaf-spotting disease attacking *Phaseolus angularis*, *P. aureus*, *Stizolobium aterrimum* [*Mucuna aterrima*], *S. deeringianum* [*M. deeringiana*], *S. cinereum* [*M. cinerea*], cowpea, *Clitoria ternatea*, and *Soja* sp., identified as being caused by *Chaetoseptoria wellmanii* [*R.A.M.*, 26, p. 127], has been observed in Costa Rica. The seed of all species came from Venezuela with the exception of *S. cinereum* from Honduras and *Soja* sp. from Cuba. The leaf spots are at first scattered, dark coffee coloured, and scarcely visible to the naked eye. Others soon develop to form more or less circular areas 1 to 6 mm. in diameter, surrounded by a dark chestnut brown circular or lobed halo. They become banded alternately in light coffee colour and white with light brown centres, some reaching 1·5 cm. in diameter. Finally the centres drop out leaving a fish-eye appearance.

Unless control measures are taken in time the leaves dry and fall and the plant becomes unproductive. All plants except cowpea and *Soja* sp. responded to winter treatments with parzate and basicop No. 2 at $1\frac{1}{2}$ and 4 lb., respectively, to 100 gals. water, and Bordeaux mixture (5–5–50), applied every eight or ten days. After three treatments the progress of the fungus was checked, new leaves developed normally and the plant bore fruit.

Pycnidia in the white and coffee-coloured areas contained curved, granulose, hyaline, filamentous conidia, 96 to 150 by 5 to 6 μ.

Stoner (W. N.), Stover (L. H.), & Parris (G. K.). **Field and laboratory investigations indicate Grape degeneration in Florida is due to Pierce's disease virus infection.**—*Plant Dis. Reptr*, 35, 8, pp. 341–344, 3 figs., 1951. [Multilithed.]

After briefly reviewing the history of the failure over many years to establish vines in Florida owing to degeneration of unknown cause, the writers state that Parris's (unpublished) account of the situation given at the Annual Meeting of the Plant Pathologists of the Florida Agricultural Experiment Station, 1951, indicated that the condition was very similar to Pierce's disease [lucerne dwarf virus: *R.A.M.*, 30, p. 402]. Observations in June, 1951, at the farm of the Watermelon and Grape Investigations Laboratory, Leesburg, and elsewhere showed that not all varieties displayed every symptom. Most declining plants developed a varying degree of interveinal leaf chlorosis, which when well developed gave to the dorsal surface of the yellow part a glossy appearance and the leaves were stiff. Marginal

scorch of the basal leaves was apparent, in some instances severe, and where it had spread considerably the lamina was shed, but not the petiole. Vines affected with degeneration were slow to start in the spring; asymmetrical growth was apparent, one arm failing to produce growth or having weak suckers at the base, while the other arm grew fairly normally, but tardily. Growth diminished progressively every year until the plants died. Canes were dwarfed and the internodes shortened. Vines with sufficient vigour to fruit produced flaccid, withered clusters. In autumn the canes did not ripen properly, green areas persisting between the nodes. In the Leesburg area difficulty has been experienced in the nursery in rooting cuttings, which either failed to grow or made weak growth for a season or two, then degenerated and died.

Experience has made it possible to group Florida vines into six classes according to longevity. Group 1 (*Vitis vinifera*) is the shortest-lived (about two years or less, over 100 varieties tested); group 2 (*V. labrusca*), containing varieties such as Concord, Niagara, Worden, Fredonia, and Portland, lives three to four years; group 3, consisting of Catawba only, lives three to five years; group 4 comprises the Texas Post Oak hybrid varieties Extra (Florida Beacon), Carman, Bailey, and Muench (five to eight years). Hybrids of many varieties with *V. simpsoni*, the native wild vine, are under trial at Leesburg and have lived well since 1946, with no sign of degeneration; these have been placed in group 5, while *V. simpsoni*, which shows no sign of degeneration, is in group 6.

The xylem elements of the canes and petioles contained gum deposits and tyloses, which Esau has shown can be induced in the xylem elements of vines by lucerne dwarf virus (*Hilgardia*, 18, 12, pp. 423–482, 1948).

It has long been known in central Florida that when Bermuda grass (*Cynodon dactylon*) invades a vineyard the vines degenerate. Insect collections were made on 5th June, 1951, from this grass at Leesburg, where degeneration had almost destroyed a seven-year-old commercial vineyard of the variety Extra. Large numbers of *Carneocephala flaviceps*, which is closely related to *C. fulgida*, one of the principal vectors of lucerne dwarf in California [*R.A.M.*, 29, p. 8], were captured. Winkler [cf. ibid., 29, p. 245] lists Bermuda grass as susceptible to the virus in California. *C. flaviceps* was also collected in large numbers on Bermuda grass at Eustis, Florida, where the vineyards contain 40 per cent. degenerate plants. Further work is in progress.

VRYONIDES (T.). **Fungus diseases and insect pests of the Vine.**—*The Countryman, Cyprus*, 5, 7, 15–18, 1951.

Powdery mildew (*Uncinula necator*) is reported to cause grave damage to vines under Cyprus conditions [*R.A.M.*, 2, p. 394] just before the fruit ripens, or at blossoming time. To control the disease under such conditions four dustings with a fine grade sulphur when the new shoots are 6 to 9 in. long, again when they are 12 to 18 in., about blossoming time, and 14 days later, are recommended. Downy mildew (*Plasmopara viticola*) is also reported as being very troublesome [ibid., 10, p. 773].

MARAMOROSCH (K.). **Effect of dosage on length of incubation period of Aster-yellows virus in its vector.**—*Proc. Soc. exp. Biol., N.Y.*, 75, 3, p. 744, 1950.

At the Rockefeller Institute for Medical Research, New York, fluids from viruliferous *Macrosteles divisus*, the vector of aster yellows virus [*R.A.M.*, 28, pp. 45, 109, 265], were diluted to 10^{-1} and 10^{-3} with saline and injected into non-viruliferous leaf hoppers at the rate of 1/8,000 ml. per insect. The results of infectivity tests on the injected vectors under controlled environmental conditions showed that the minimum incubation periods at dilutions of 10^{-1} and 10^{-3} were 11 to 15 and 24 to 38 days, respectively.